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Carbohydrate Intake and Menopausal Symptoms

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CARBOHYDRATE INTAKE AND MENOPAUSAL SYMPTOMS

by

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This thesis, submitted by Katherine Trahan Edwards, in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been completed and is hereby approved.

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This thesis meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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ABSTRACT

More women are going through the menopausal transition today than at any time in the history of our civilization. The number of women greater than 50 years of age has increased by 27% between 1990 and 2000, and is expected to increase by another 9% by 2020. Women who are transitioning through menopause often experience a variety of symptoms, including hot flashes, night sweats, insomnia, irritability, memory loss, decreased libido, and depression. Symptoms occurring during the menopausal transition may also be confused with changes associated with aging, including increased abdominal obesity, insulin resistance, and the metabolic syndrome; for example, fatigue, brain fogginess, feeling agitated and moody, and depression.

While studies have explored the relationship between carbohydrate, fat, and fiber content on weight and fat loss, and diabetic risk, and other chronic diseases, only one study was found that specifically linked dietary intake with a reduction in menopausal symptoms. The purpose of this study was to explore and compare dietary intake, specifically carbohydrate and fiber, and its effect on menopausal symptoms. Menopausal status and its effect on menopausal symptoms were also examined.

The conceptual framework used for this study was physiological adaptation. The population of the study consisted of Caucasian women ranging in ages from 42-65. The convenience sample was drawn mostly from university staff in a Midwestern city, and most of the women was married, perimenopausal, not on hormonal replacement therapy,

and had a total of two pregnancies. The study was descriptive in design, and employed three self-reported tools to acquire the information needed for the study. The investigators secured IRB approval from the university prior to soliciting participants, and consent forms were signed prior to filling out the questionnaires. The data was analyzed by using SPSS, and Cronbach's co-efficiency test, t-test, Chi-Square, Pearson's r correlation, and Hierarchical Regression Models statistical tests.

The results showed no statistical significant relationship between dietary intake of carbohydrate and fiber and menopause symptoms, however there was some clinical significance found when looking at the effect size. Carbohydrates and grains did have practical significance showing a small effect over and above all of the other predictors on menopausal symptoms. This effect was independent of sample size, and the findings may show natural alternatives to relieving menopausal symptoms and deserve further study. These findings have implications for aging women and their primary health care providers, and provide a basis for further research and development of nursing theory related to dietary intake and menopausal symptoms.

CHAPTER I

REVIEW OF LITERATURE

Introduction

There are more women going through the menopausal transition today than at any time in the history of our civilization. According to the North American Menopause Society, "in year 2000, almost 4300 U.S. women reached menopause per day, totaling close to 1.6 million women in that year. The number of women greater than 50 years of age has increased by 27% between 1990 and 2000, and is expected to increase by another 9% by 2020" (North American Menopausal Society, 2004). Large numbers of women are reaching the menopausal transition which has implications for the women and their health, as well as their adjustment to this new phase of their lives. Due to the large number of women reaching this status, and the recent HRT study findings, women are looking for natural alternatives to relieve their menopausal symptoms. Dietary intake is one natural alternative that women may use to affect changes to alleviate these symptoms, and very little research has been conducted on dietary intake's effects on menopause symptoms.

Purpose of Study

The purpose of this study was to explore the relationship between dietary intake of carbohydrates and fiber and menopausal symptoms. The following research questions were investigated:

1. What is the relationship between dietary intake of carbohydrates and the severity of menopausal symptoms in perimenopausal and postmenopausal women?
2. What is the relationship between dietary intake of fiber and the severity of menopausal symptoms in perimenopausal and postmenopausal women?

Symptoms Occurring in the Menopausal Transition

The menopausal transition is typically accompanied by a variety of symptoms – symptoms that may add additional stress to a woman's physical and psychological status. Symptoms may range from hot flashes, irritability, night sweats, and memory loss to insomnia, sexual changes, and depression (Gold et al., 2004). The severity of symptoms varies according to body mass, passive cigarette smoke exposure, hormonal levels, and by race and ethnicity (Gold et al., 2004). Vasomotor symptoms, some of the most common symptoms of menopause, include hot flushes, cold hands and feet, heart palpitations, shortness of breath, numbness and tingling, loss of feeling in the hands and feet, dry eyes, and headaches (Hansen, 1998). Reported by up to 75% of women, the hot flash is the second most frequent symptom of the perimenopausal period, and is exceeded only by irregular menses (North American Menopause Society, 2004). The term perimenopausal, in this study, will be defined as a woman nearing the menopause transition but still menstruating. A temperature change of up to seven degrees may occur causing the body to readjust its thermostat many times during the day (Hansen, 1998). Other somatic symptoms include vaginal dryness, decreased sexual libido, urinary complaints, and joint and muscular complaints (Perz, 1997).

Psychological symptoms of menopause are diverse and diffuse, and often include tense feelings, excitability, depressed feelings, moodiness, irritability, pressure or tightness in the head or body, crying spells, and needless worry (Perz, 1997). Psychological symptoms are often difficult to assess as to whether they are hormone related or there is a deficit of neurological transmitters or both. Further assessment may need to be conducted to determine the origin of these particular symptoms.

Hormonal changes associated with perimenopause and postmenopause place a woman at risk of experiencing the various symptoms highlighted above. Table 1 summarizes the relationship between hormones and symptoms.

Table 1. Hormonal Changes and Risk of Symptoms of Perimenopausal & Postmenopausal Women.

Menopausal Symptom	Estradiol	Testosterone	Progesterone
Vaginal Atrophy/ Urinary incontinence	Decreased	Decreased	Increased
Decreased libido	Decreased	Decreased	Increased
Depression/ Decreased cognitive function	Decreased	Decreased	
Anxiety			Decreased
Thin, fragile, dry skin	Decreased	Decreased	Decreased

Adapted from Collins, J. (2001). Management of menopause type® seminar, accessed 2-13-05, www.yourmenopausetype.com.

Quality of Life

Symptoms experienced by a woman during the menopausal transition may also have a bearing on how the woman perceives her quality of life. Garanszegi et al. (1998)

found that "women equated menopause to the experience of menopausal symptoms (p. 171)." They postulated that it is the occurrence of symptoms and not the cessation of menses that causes a woman to consider herself to be actively going through the menopausal transition. Depending on how severe the symptoms are perceived to be, they may affect a woman's quality of life as well. Assessing the woman's quality of life is important in identifying the way the woman feels about herself and how well she functions in normal daily affairs (Wiklund, 1998). According to Utian (2002), assessing a woman's quality of life is essential to determining "the woman's global sense of self-satisfaction, how she felt generally and specifically with interest in life, and ability to complete a day's work, maintain satisfactory interpersonal relationships, and a general feeling of wellness (p. 403)." Thus, a woman's quality of life appears to be an important variable to consider when assessing a woman's experience in the perimenopausal or postmenopausal periods.

Menopausal Symptom Instruments

A variety of instruments have been used to measure the diversity and severity of menopausal symptoms, including the Blatt-Kupperman Index (Greene, 1976), the Greene Climacteric Scale (Greene, 1998), the Women's Health Questionnaire (Hunter, 2000), the Menopausal Symptom List (Perz, 1997), and the Menopausal Rating Scale (Schneider, Heinemann, Rosemeier, Potthoff, & Behre, 2000). Now considered outdated, the Blatt-Kupperman Index was one of the first instruments used by physician's to assess the severity of menopausal symptoms. Finding the Blatt Menopausal Index to be inadequate, Greene (1976) developed the Greene Climacteric Scale, the first scale of its type to be constructed using a factor analysis (Greene, 1998). Rather than a list of symptoms (as in

the Blatt-Kupperman Index), Greene's instrument grouped 21 symptoms according to subscales: vasomotor, somatic, anxiety, and depression. Subsequent scales were also constructed based on factor analysis. For example, the Women's Health Questionnaire (Hunter, 2000) has 32 symptoms and consists of eight subscales, four of which are the same as the Greene Climacteric Scale. The Menopausal Symptom List (Perz, 1997) has 25 symptoms and three subscales: vaso-somatic, general somatic and psychological. The Menopause Rating Scale (Schneider, Heinemann, Rosemeier, Potthoff, and Behre, 2000), constructed by German physicians, has eleven items with three independent dimensions, or subscales: somatic, psychological and urogenital.

Two instruments specifically evaluating a woman's quality of life have been developed. The Menopause-Specific Quality of Life Questionnaire (Hilditch, et al., 1996) focuses on the postmenopausal period and addresses "condition-specific quality of life (p. 162)." This tool was constructed using the importance score method which was based on the frequency of occurrence and degree to which the women considered the symptom to be annoying. It resulted in 30 items with four domains: vasomotor, physical, psychosocial, and sexual. It has been criticized for not adequately addressing culturally sensitive concerns (Bener et al., 2000). Utian, Janata, Kingsberg, Schluchter, Hamilton (2002), asserted that quality of life (QOL) is more than symptoms, and is based on the woman's perception of well-being. Their instrument, the Utian Quality of Life Scale, has 23 items with four components of Quality of Life: occupational, health, emotional, and sexual. Refer to Tables 2 and 3 for a summary of characteristics for these instruments.

Table 2. Subscale Structure of Menopause-Specific Scales.

Blatt-Kupperman Index	Greene Climacteric Scale	Women's Health Questionnaire	Menopausal Symptom List	Menopause Rating Scale	Menopause-Specific QOL Questionnaire	Utian QOL Scale
No subscales	Vasomotor	Vasomotor	Vasosomatic	Somatovegetative	Physical	Occupational QOL
	Somatic	Somatic	General somatic	Urogenital	Vasomotor	Health QOL
	Anxiety	Anxiety	Psychological	Psychological	Psychosocial	Emotional QOL
	Depression	Depression			Sexual	
		Cognitive				Sexual QOL
		Sleep				
		Sex				
		Menstrual				

Adapted from Schneider, HPG. (2002). The quality of life in the post-menopausal woman, *Best Practice & Research Clinical Obstetrics and Gynaecology, 16*(3): 395-409.

Table 3. Characteristics of Menopause-Specific Scales.

Name of Scale	Number of Items	Rating Points	Rating Measure	Number of Subscales	Reliability of Subscales
Blatt-Kupperman Index	11	3	Severity	0	Not Available
Greene Climacteric Scale	21	4	Severity	8	0.83-0.87
Women's Health Questionnaire	32	2	Present/Absent	8	0.78-0.96
Menopausal Symptom List	25	6	Frequency/Severity	3	0.74-0.82
Menopause Rating Scale	11	5	Severity	3	0.60 (average)
Menopause-Specific QOL Questionnaire	30	7	Severity	4	0.55-0.81
Utian QOL Scale	23	5	Severity	4	Not Available

Adapted from Schneider, HPG. (2002). The quality of life in the post-menopausal woman, *Best practice & research clinical obstetrics and gynaecology, 16*(3): 395-409.

Menopause and the Metabolic Syndrome

The following sections are based on the assumption that a complex interaction exists between hormonal changes during the menopausal transition, the rising incidence of insulin resistance and ultimately the metabolic syndrome, dietary intake, and resulting physical, cognitive, and emotional symptoms. A review of literature did not reveal a direct connection between the menopausal transition and any physical or cognitive changes occurring as a women ages nor the mechanism involved. A review of literature showed that as women age, there is a rising incidence of insulin resistance and concurrently the metabolic syndrome. It is further conjectured that carbohydrates play an important role in that cascade of events. There has been a growing popularity of the Atkins and other low carbohydrate diets. Further, in the investigators' experience, perimenopausal and postmenopausal women have reported anecdotally that they experience an improvement in their symptoms when they alter the type and quantity of carbohydrates in their diets; that is, symptoms appear to diminish when they decrease their intake of refined sugars, white potatoes, white rice, sweet desserts, and other foods that are considered high in the glycemic index. Yet an extensive review of literature has not revealed a direct connection between carbohydrate intake and menopausal symptoms. The following discussion will present a summary of literature explored.

Symptoms occurring during the menopausal transition may be confused with changes associated with aging, including increased abdominal obesity, insulin resistance, and the metabolic syndrome. Examples of these symptoms include depression, moodiness, and feeling agitated. Other symptoms associated with aging include bone and joint tenderness, urinary problems, and fatigue. Along with these symptoms of aging and

menopause, one study by Otte (2005) addressed how women in particular are at increased risk for developing age-related diseases because of their increased cortisol response. This section will explore the relationship between aging, the metabolic syndrome, and menopause.

As women age, they are at increased risk for cardiovascular disease, hypertension, and insulin resistance and Type 2 diabetes. In addition to metabolic and hormonal changes associated with aging, it is noted that women and older adults are among the most sedentary and obese subsets of the U.S. population (Obesity Education Initiative Task Force, 1998). Nearly one-third of all women in the U.S. are overweight and another one-third are obese. The obesity rise peaks in women in their 40's and 50's, occurring concurrently with the menopausal transition. Further, being postmenopausal, obese, and having a sedentary lifestyle are independent risk factors for cardiovascular disease (CVD), including atherosclerosis and myocardial infarction (Manson et al., 1990; Carels, Darby, Cacciopaglia, & Douglass, 1990). CVD is the leading cause of mortality and morbidity among U.S. women after the age of 50 (Carels, Darby, Cacciopaglia, & Douglass, 2004), and approximately 50% of the cardiovascular events in women are related to the metabolic syndrome (Carr, 2004).

> It is becoming increasingly clear that hypertension and metabolic risk factors in women are inter-related and often share underlying causes. Menopause acts explicitly as a risk factor by reducing the direct beneficial effect of ovarian hormones upon cardiovascular functions and indirectly by negatively influencing other risk factors for coronary artery disease – i.e. hyper-insulinaemia, blood

cholesterol, blood pressure, coagulation etc. (Rosano, Vitale, Silvestri, & Fini, 2004, p. 20.)

Some researchers (Carr, 2004; Spencer, Godsland, Stevenson, 1997) have suggested that a "menopausal metabolic syndrome" exists. It is conjectured that the decrease in estradiol-17 beta (a corollary of the menopausal transition) is associated with a woman's increased risk of postmenopausal metabolic syndrome. Evidence suggests that the drop in estradiol-17 beta accounts for increased total cholesterol and triglycerides; decreased high density lipoprotein (HDL) and HDL sub fraction 2; increased low density lipoprotein (LDL), especially the small, dense sub fractions; increased lipoprotein (a); increased insulin resistance; decreased insulin secretion and elimination; increased android fat distribution (central abdominal adiposity); impaired vascular function; increased factor VII and fibrinogen, and reduced sex hormone binding globulin (Spencer, Godsland, & Stevenson, 1997; Carr, 2003). This set of changes is complex and a detailed discussion is not given here. However, a key element that is consistent in the literature is the accelerated "selective deposition of intra-abdominal fat (Tchernof, Poehlman, & Despres, 2000, p. 12)" during the menopausal transition. Controversy exists as to whether it is the decrease in estrogen that contributes to the metabolic syndrome or other factors that may be involved as well. What is clear is that weight gain, and particularly obesity, has a strong influence on the development of impaired glucose metabolism (Tufano, Marzo, Marricone, Caviezel, & Amrosi, 2004; Carr, 2003), and that women with higher visceral abdominal fat had higher insulin and triglyceride levels (Kim et al., 2004) It is also widely accepted that obesity and hypertension are significantly related (Wilson, D'Agostino, Sullivan, Parise, & Kennel, 2002).

Dietary Intake and Chronic Disease

Several studies examine various examples of dietary combinations and their impact on developing insulin resistance, weight loss in obese patients, and better control in diabetic patients aimed at decreasing risk for CVD. However, no one method of dietary combinations has been found to be conclusive. Studies have focused on the carbohydrate and fat content of diets. Hollenbeck and Coulston (1991) indicated that "the major emphasis in recent years has been on the reduction of total fat and saturated fat and replacement with complex carbohydrate (p. 774)." Simkin-Silverman and Wing (2000). suggested that "low fat diets may aggravate the effect of insulin resistance on blood lipids, and suggest a diet low in saturated fat (<10% of total calories) and more moderate in total fat (40% of calories) for those who are insulin resistant (p. 53)." In a comparison of two high-carbohydrate (40% and 60%), low-fat diets, Coulston, Liu, and Reaven (1983) found no differences in fasting plasma glucose, insulin or cholesterol levels. However, they reported that fasting plasma triglyceride levels were significantly elevated and the high density lipoproteins (HDL) levels were significantly decreased in the individuals on the 60% carbohydrate diet. In a similar study, Tavani et al. (2003) found that individuals who consumed a high-carbohydrate diet had an increased the concentration of very low density lipoproteins and triglycerides and a decrease of the high density lipoproteins. In contrast, results of low-carbohydrate (<20 grams/day or <10% of daily caloric intake) diets consistent with the popular Atkins approach higher fat and protein intakes were compared to those of low-fat (30% fat with 55% carbohydrate and 15% protein) diets. Brehm et al. (2002) found that obese women in the low-carbohydrate diet group lost more weight, and more body fat and lean body mass than

women in the low fat diet group. Lipid profiles improved for both groups, with significant decreases in total cholesterol, LDL cholesterol, and triglycerides at three months and significant increases in HDL cholesterol at six months. Glucose, insulin and plasma leptin levels significantly decreased during the study. Similarly, Yancy et al. (2004) in a study of obese, hyperlipidemic individuals (sample consisted of approximately 70% women) found greater weight loss, reduced serum triglyceride and increased HDL cholesterol levels in the low-carbohydrate diet group as compared to the low-fat diet group. The study conducted by Salmeron et al. (1997) found that a diet with a high glycemic load and a low fiber intake (primarily cereal fiber) showed an increased risk of Type 2 diabetes in men. Various types of dietary changes showed improvements in weight losses and blood serum levels, but no long term studies have been done with any of these diets. The National Center for Complementary and Alternative Medicine has recently funded a long term study (April 2003 – May 2007) that compares the impact of a low-carbohydrate diet with a conventional high-carbohydrate, low-fat diet on weight, body composition, metabolic and organ function, and exercise tolerance (NCCAM, 2005). Table 4 summarizes some of the results of the above studies.

Other studies focused on the fiber content of foods and its impact on metabolism and weight. Liu et al. (2003) did a twelve years study and compared the weight change of women based on their intake of grains. Women who ate more whole grains had a decrease in weight while those who ate more refined grains (white bread, pasta, rice) experienced an increase in their weight. Kilocalories were kept relatively constant between the two groups despite the varying diets. Various studies have demonstrated "inverse relationships between whole-grain intake and ischemic stroke and coronary

Table 4. Comparisons of Outcomes by Diet and Type.

Author / Authors of Study	Diet Type Studied	Outcomes of Study
Coulston, Liu, & Reaven (1983)	Compared 40% and 60% High Carbohydrate Diets and Low fat Diets	Similar fasting glucose, insulin, and cholesterol levels, decreased HDL, increased triglicerides
Tavani et al. (2003)	High Carbohydrate	Increased LDL and VLDL Decreased HDL
Brehm (2002)	Compared: Low Carbohydrate (<10% daily) to Low Fat (55% carb/15% fat)	Low carbohydrate group: Increased weight loss Increased body fat loss
Yancy et al. (2004)	Low Carbohydrate	Increased weight loss Decreased triglicerides Increased HDL

artery disease risk and deaths" (Fung et al., 2002, p. 539). Further research demonstrated that diets low in fiber were associated with significant increases in colorectal cancer (Higgenbotham et al (2004). Salmeron et al., (1997) and Fung et al., (2001) reported a strong relationship between total intake of dietary fiber and a decreased risk of Type 2 diabetes. While these studies do not appear to have a direct impact on menopausal symptoms, they speak to the interrelationship between dietary intake and resulting physiologic adaptation of the body. In their study, Fung el al. (2002), also found that participants (in this case, men) "with higher whole-grain intakes tended to be leaner and more physically active, to consume less fat, and be less likely to smoke…" (p. 537). Thus, the variable of dietary fiber may be a substitute for other characteristics that are interrelated with physical manifestations. Another example of the complexities of

studying dietary fiber is its relationship to phytoestrogens. Intake of phytoestrogens has been associated with a decrease in vasomotor symptoms associated with menopause (Rakel, 2003). One of the components of phytoestrogens is lignan which is found in flaxseed and in most cereal grains and vegetables. Thus, it could be the phytoestrogens, and not the fiber that is related to a decrease in symptoms. However, women in the study were less likely to consume measurable quantities of phytoestrogens; thus measurements of fiber may serve as a proxy for other nutrients. Gold et al. (2004), assessed diet and menopausal vasomotor symptoms. Though the relationship between a high fiber diet and reduced vasomotor symptoms was not statistically significant, fewer vasomotor symptoms were noted among the Asian women in the study. Lupton, (2002) from the National Academies of Sciences announced the RDI (recommended daily intake) for fiber intake which was derived from assessing comprehensive literature on dietary studies. The official guidelines recommend 25 grams of total fiber for men and women per day, and that the intake comes from whole grain foods rather than food supplements, (United States Department of Agriculture, 2005). The RDI for women over 50 years is 21 grams of total fiber per day. The National Cancer Institute recommends 25 grams of dietary fiber with an upper limit of 35 grams per day with a mix of soluble and insoluble fiber. Therefore, a diet high in fiber may not show a direct correlation with a reduction of menopausal symptoms in this study, however, the numerous studies listed above indicate that a high fiber diet may reduce risk for or prevent chronic disease.

Dietary Intake and Menopause

While a number of studies have explored the impact of varying levels of dietary carbohydrates and fat on weight loss, metabolism, and serum profiles, little attention has

been given to dietary intake for the woman experiencing the menopausal transition. The North American Menopause Society (2004) recommends a diet "high in grain products, vegetables, and fruits as well as low in saturated fats and cholesterol (p. 89)." The current recommendations include at least five fruit and vegetable servings and eight glasses of fluid daily, with decreased use of sugar, salt and alcohol. Because of the propensity for weight gain during the perimenopausal period, and particularly central adiposity, women are encouraged to decrease fats in their diets and to ensure adequate physical activity to balance energy intake. Stokes (2003) recommends including a variety of fruits and vegetables to relieve menopausal symptoms and promote health. Collins (2000) suggested that certain fruits and vegetables contain phytoestrogens which are "plant substances that have estrogen-like activities, and may be significant in easing the symptoms of menopause (p. 35)." Only one study was found that specifically linked dietary intake with a reduction in menopausal symptoms. Park et al. (2003) found that perimenopausal and postmenopausal Korean women who ate more fish, soy, fruits, and vegetables and less red meat, salt, sugar, processed foods, and coffee had fewer vasomotor symptoms, including hot flushes and night sweats.

There may also be a connection between perimenopausal and premenstrual symptoms. Since hormonal changes during the perimenopausal period often mirror those experienced premenstrually (a drop in progesterone and estrogen levels), dietary changes resulting in improved premenstrual symptoms may affect perimenopausal women in a similar manner. While the impact of dietary intake is inconclusive, studies (Johnson et al., 1995; Johnson, 1998; Christensen, 1997) have suggested a relationship between intake of carbohydrates, particularly complex carbohydrates, and a reduction of

symptoms; e.g., "improved depression, tension, anger, confusion, sadness, fatigue, alertness, and calmness..." (Johnson, 1998, p. 410). These findings may assist in explaining the impact of carbohydrates on menopausal symptoms.

Summary of Literature Review

In summary, this review has documented the increasing number of women who are approaching the menopausal transition, and the plethora of symptoms common among women of this age group that may affect their overall quality of life. The myriad of hormonal and metabolic changes that women in this phase of life experience may, indeed, place them at greater risk of insulin resistance (or metabolic syndrome), diabetes, and cardiovascular disease. Varying combinations of carbohydrates, fiber and fat have been explored to clarify their impact on a woman's state of health. It has been suggested that dietary changes may improve a woman's symptoms; however, very little documentation bears that out, leaving unanswered questions.

Operational Definitions

The following operational definitions were used in this study.

Carbohydrates were measured using Block's 98 Food Frequency Questionnaire®. Analysis of nutrients was conducted by Block Dietary Data Systems. Items used to represent carbohydrates were: percent of kilocalories from sweets and desserts; daily servings of vegetables; daily frequency of fruits and fruit juices; and daily servings of breads, cereals, rice and pasta.

Fiber was also measured using the Blue Block 98.2 Food Frequency Questionnaire® and the Block Dietary Data Systems' nutrient analysis. Items used to

represent fiber were dietary fiber from beans, dietary fiber from vegetables and fruit, dietary fiber from grains all listed in grams, and total dietary fiber listed in grams.

Menopausal symptoms were calculated using the Menopause Rating Scale. Symptoms were categorized according to the following dimensions: psychological symptoms, somato-vegetative symptoms, and urogenital symptoms.

A woman was considered *perimenopausal* if she fell between 42 and 65 years of age and had had a menstrual period within the past twelve months.

A woman was considered *postmenopausal* if she fell between 42 and 65 years of age and had not had a menstrual period within the past twelve months.

Theoretical Framework

The process being assessed in this study involves a woman's menopausal transition; that is, the physiological adaptation of a woman's body, usually from a lifelong pattern of menses, to cessation of menses. One must also consider the simultaneous impact of aging, recognizing the interconnectedness of the two. The conceptual framework used for this exploration was physiological adaptation. Hansen (1998) defined adaptation as the physiologic response of the body to "restore system homeostasis," (p. 19) and is "essential to human function" (p. 19). Menopause is a part of the natural aging process in women, with symptoms that typically begin when the body has depleted its store of oocytes. Hansen (1998) wrote:

> It is unknown whether the menopause, also known as climacteric, occurs because of depletion of ovarian follicles, with the resulting alteration of feedback to the hypothalamic-pituitary-adrenocortical (HPA) axis, or whether it occurs because of

genetically programmed changes in neural input to the HPA axis, resulting in altered signaling to the ovaries. It is possible that both events serve a "pacemaker' function." (p. 901)

Even before the oocytes are exhausted in number, changes in the menstrual cycle are experienced, resulting in a decrease of fertility and irregular cycles. This irregularity may accompany the onset of symptoms and may begin at any point during perimenopause. It is unclear exactly what physiological mechanisms trigger symptoms. Hansen (1998) suggested that increased levels of follicle stimulating hormone, widely varying levels of estradiol, or "inappropriate inputs to the hypothalamus during altered HPA regulation" (p. 901) may explain the vasomotor instability so common in the menopausal transition. Collins (2005) stated that "these abrupt spikes of estradiol, progesterone, and testosterone, may occur during perimenopause and are often accompanied by both physical and psychological changes."

Women experience a dynamic shift during the menopause transition and aging resulting in further physiological adaptation. The basal metabolism rate slows as a person begins to age. Since growth is no longer the priority as in childhood, adolescence, and young adulthood, the body needs fewer calories to sustain life. Aging initiates a chain of events which sets a negative feedback loop into motion.

An example of the negative feedback loop that serves as an adaptive mechanism in the body is as follows: Aging decreases the metabolism rate, less energy is needed to maintain the same amount of work, a reduction of energy is realized, the individual then reduces the caloric intake, no excess fat is stored, and optimal weight is maintained for that individual. If the individual does not reduce the caloric intake or increase the activity

level, the middle aged woman may exhibit central or truncal obesity. Since estrogen is no longer being produced by the ovaries, the increased fat storage may be an attempt by the body to adapt to the decrease in estrogen by increasing the estrogen production in the adipose tissue. This could explain why women have a tendency to gain weight during the time of perimenopause.

Another example of the body's adaptation to the changes specific to the menopausal transition is its adjustment to the varying levels of hormones. The production of estrogen decreases and shifts from the ovaries to other parts of the body during the menopausal transition, and is done primarily by the adrenal glands and the adipose tissue. The follicular stimulating hormone (FSH) and lutenizing hormone (LH) increases as the estrogen decreases (Speroff, Glass, & Kase, 1999). Physical changes, such as the onset of irregular menses result in fewer ovulatory cycles and decreased fertility, representing the body's adaptation to the shifting production of hormones.

During the process of adapting to decreased levels of estrogen, the body ceases to menstruate (Speroff, Glass, & Kase, 1999). According to the accepted definition of menopause, this would be the end of the physical adaptation. However, since studies show that many women continue to experience menopausal symptoms years after the cessation of menses, (Barentsen, van de Weijer, van Gend, & Foekema, 2000), (Garamszegi, 1998), one would wonder if the body's adaptation to menopause is, in fact, completed.

The body is a magnificent machine that can adjust to its environmental, psychological, social, and emotional stressors. It has systems within systems to fine tune processes, and has feedback loops to prevent damage from excesses or deficiencies. The

framework of adaptation may be equated to the model of a coil. The coil represents the levels of adaptation within the body from the first symptom of menopause to the last symptom. The graphic representation of this physiological adaptation framework is portrayed in Figure 1. The base of the coil represents the phase prior to the menopausal transition, or premenopause. The coil represents the continuum of menopausal symptoms that are theoretically influenced by carbohydrate and fiber intake within the diet and the hormonal changes. The opposite end, or the top of the coil, indicates that a woman has successfully passed through the menopausal transition and has moved into a state of postmenopause.

Assumptions

The following assumptions were made during the study:

1. Women honestly and to the best of their recall completed the Food Frequency Questionnaire and the Menopause Rating Scale.
2. Nutrients identified by the Food Frequency Questionnaire were reliable and valid.

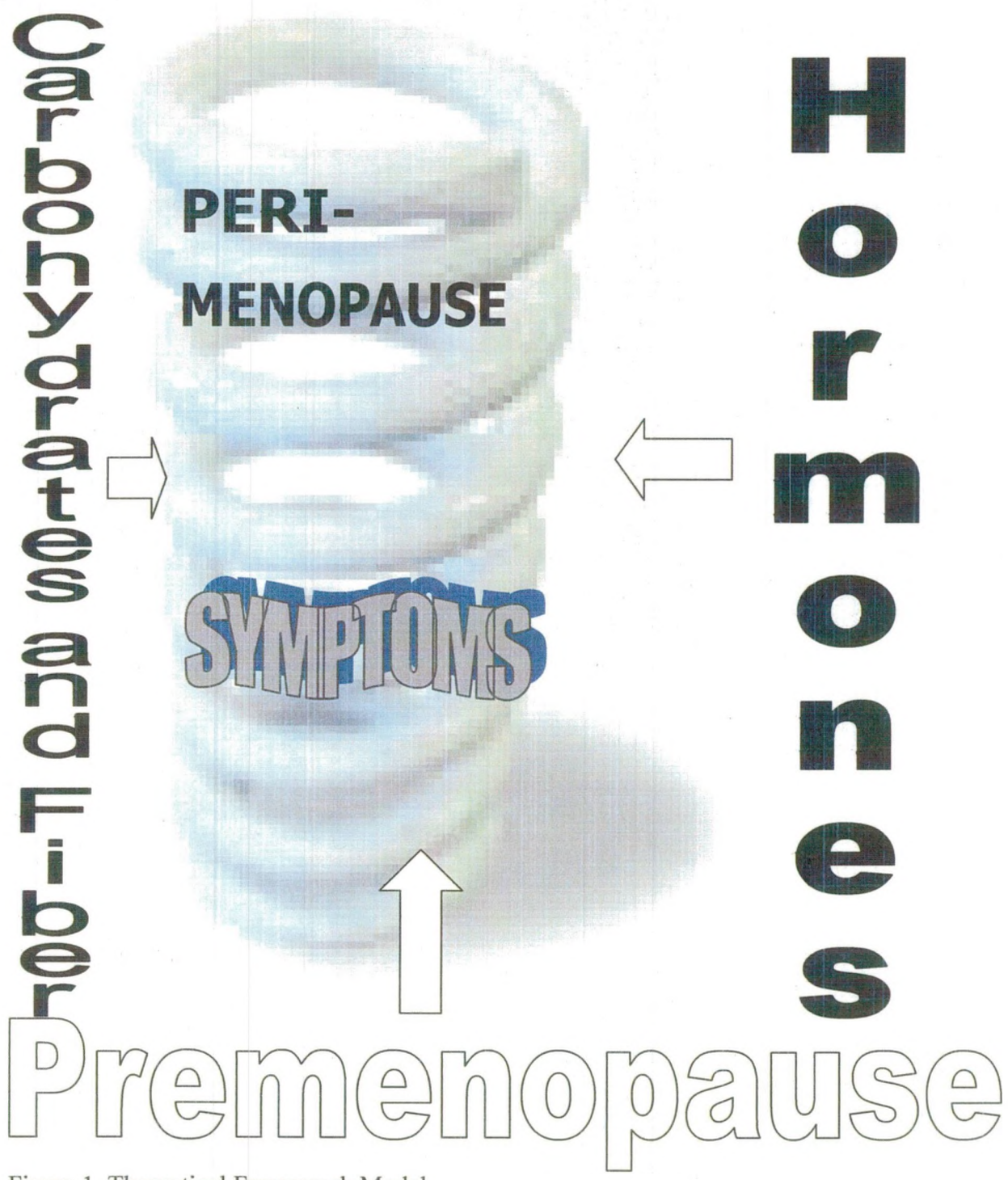


Figure 1. Theoretical Framework Model.

CHAPTER II

METHODOLOGY OF THE STUDY

This study explored the relationship between dietary intake of carbohydrates and the severity of menopausal symptoms. The study design was descriptive in nature and used survey methods. The research questions explored were:

1. What is the relationship between dietary intake of carbohydrates and the severity of menopausal symptoms in perimenopausal and postmenopausal women?
2. What is the relationship between dietary intake of fiber and the severity of menopausal symptoms in perimenopausal and postmenopausal women?

This chapter will describe methods use for collection and analysis of data.

Population and Sample

The population of this study included adult women, 42 to 65 years of age, residing in a rural Upper Midwest area, who were able to read and comprehend English. Women were excluded from the study if they had had a tubal ligation within the past year or history of a hysterectomy; or were undergoing treatment for diabetes, cancer, or any condition requiring prescription steroid hormone or antipsychotic medication. A convenience sample was drawn from employees of a Midwestern university community consisting of about 16,000 individuals with approximately 1300 women being targeted for recruitment. Fifty-nine women were recruited through direct campus mailings,

university wide e-mails, and personal contact. Two women who were not employees of the university heard about the study by word of mouth, and participated in the data collection.

Study Design and Instruments

The study design was descriptive and employed self-report measures to summarize biographic information, dietary intake, and frequency and severity of menopausal symptoms. These measures included three self-completed questionnaires: The Health History Form (HHF), The Menopause Rating Scale (MRS), and the Blue Block 98.2 Food Frequency Questionnaire® (FFQ); (see Appendix A for forms). Potential participants were contacted, and if interested, the woman called to schedule an appointment. During her appointment, the woman completed the HHF, the MRS, and the FFQ. Additional data were collected as part of a broader study, Integrative Analysis of Menopause (I AM); for example, each woman also completed the Menopause Type® Questionnaire, the Utian Quality of Life Scale, and a brief interview about the extent and type of physical activity. Body measurements were also taken. The instruments used in data collection are described below.

Health History Form

The Health History Form was adapted from an intake form developed by Collins (2000), and includes biographical information; medical and surgical history; menstrual and menopausal history; alternative treatments used for menopausal symptoms; and current medications and supplements. The HHF was adapted from an intake form widely used in colleges of naturopathy, and has been used by Collins [a member of the I AM research team] with over "literally thousands of women (Collins, 2005)" in his clinical

practice and in his consultation with physicians and other healthcare providers throughout the U. S. The form was further modified for the I AM study in collaboration with Dr. Collins; the modified HHF was pilot tested by this investigator, but no validity nor reliability studies have been conducted on the form. Ten women completed the HHF between June and August, 2004. Only one change (the addition of Last Menstrual Period) was made to the form. Detailed historical information collected using the HHF will be used in the broader I AM study; however, for the purposes of this study, the only data items used in the analysis were: participant's marital status, her menopausal status (perimenopausal or postmenopausal), and the number of pregnancies that she reported. (Refer to Appendix A for form.)

Menopause Rating Scale

The Menopause Rating Scale (MRS), developed and tested by a group of German physicians (Heinemann, L, Potthoff, P, & Schneider, H., 2004), has been translated into nine languages and has been used throughout the world in assessing the severity of menopausal symptoms. (Refer to Appendix A for form.) This instrument collects information on eleven symptoms that may be divided into three subgroups – psychological, somato-vegatative, and urogenital. These dimensions explain 59 % of the total variance of menopausal symptoms in women (Heinemann, et al., 2003). The MRS developers used a 5-point response scale to score items, with zero representing "none," and 4, "very severe" symptoms. Scores can range from 0 to 44. Data collected with the MRS has been shown to have total score reliability of 0.60 (Schneider, et al., 2000). The original study sampled 683 German women in early 1996, then re-sampled 306 of the same women late 1997 assessing their menopausal symptoms. The purpose of the re-

sampling was to assess the reliability of the MRS instrument. Findings "indicated significant agreement of the total scores in the two MRS measurements classified by severity of symptoms (p. 61)." Each subscale also had significant agreement between the samples as well. The reliability estimates for the somato-vegetative symptoms were ($\alpha = 0.25$), for psychological symptoms were ($\alpha = 0.30$), and for urological symptoms ($\alpha = 0.19$).

Food Frequency Questionnaire (Block 98.2)

The third instrument, the Block 98.2 Food Frequency Questionnaire®, collected quantitative, descriptive information about usual eating habits, food consumption patterns, and nutrient intakes for the women within the last 12 months prior to the study. The Block FFQ, in use by over 700 research groups and public health agencies in the United States, was revised in 1998 based on the NHANES III food intake data. The questionnaire was updated to reflect changes in the American diet and includes foods representing at least 90 percent of the intakes of each of the nutrients on the NHANES III database, (Block et al., 1998). The Block FFQ contains a list of 150 food items, with participants responding to frequency of intake on a Likert Scale. Portion sizes are estimated using a visual guide (Block et al., 1998) (see Appendix A for form). Amanatidis et al. (2001) used the Block FFQ as a standard against which their Australian-developed FFQ (Commonwealth Scientific and Industrial Research Organization in 1993) was compared. Subar et al. (2001) compared reported dietary intakes using the Diet History Questionnaire (DHQ), Block Health Habits and History Questionnaire (1995 version of the Block FFQ), and the Willett FFQ to repeated 24-hour recalls. They found the Block FFQ and the DHQ to be "substantially better choices" for

"assessing absolute intakes (p.1096)." The Block FFQ reported a mean correlation across all nutrients to be 0.54 for women.

Data Analysis

The completed FFQs were sent to Block Dietary Data Systems for analysis. The questionnaires were scanned, and results reported to the investigator. Items from these files were linked to other data items in the MRS and HHF to conduct the analysis. Analysis was completed in SPSS by Dr. Steve Owen, Professor, University of Texas Health Science Center at San Antonio. Data analysis was conducted using hierarchical (or sequential) regression, using two blocks to predict outcomes. The point of the block-wise approach was used to adjust the effects of dietary behaviors for a group of covariates. The first block included biographical data as covariates (marital status, menopausal status, number of pregnancies). The second block include the biographical data and also comprised the dietary variables, including total carbohydrates, total fiber, daily servings of vegetables, fruit and fruit juices, grains, and percent of kilocalories of from sweets and desserts. Block two in the second regression included the biographical data and also included the total fiber, fiber from beans, vegetables, fruits, and grains. The regression models used took into accounts all of the correlations of the variables simultaneously. These predictor variables will be discussed in relation to the MRS subscales (psychological, somato-vegetative, and urogenital).

Protection of Human Rights

Protocols for the study were reviewed and approved by the University of North Dakota Institutional Review Board. Informed consent was discussed with all participants prior to the onset of data collection, and women signed a detailed consent form,

maintaining a separate copy for themselves (see Appendix B for form). Participation was voluntary, and subjects were advised that they could withdraw from the study at any time without repercussions.

Confidentiality was assured through several means. All data forms were marked with a university-assigned identification number, and data forms were kept in a locked file during data collection. Once the data files were linked, a master list of participants was created and given to the investigator for verification purposes. All identifying information found in the data files was then deleted prior to analysis, and a random identification number was assigned to each woman. Access to the computerized data files required a secure password, creating an additional level of security. The original data (according to university policy) will be maintained in a locked drawer for five years and then destroyed.

This chapter has reviewed the methods and procedures used in the collection and analysis of data. The next chapter will discuss the results of the data analysis.

CHAPTER III

RESULTS

The purpose of this descriptive study was to explore the relationship between dietary intake of carbohydrates and fiber and menopausal symptoms. In this chapter, the sample demographics, the results of the Menopausal Rating Scale, and the dietary analysis will be presented. Findings related to the research questions will be presented. Data were analyzed using the Statistical Package for Social Sciences (SPSS). The level of significance for this study was set at less than 0.05.

Sample Demographics

Sixty-one women were invited to participate in this study. A total of sixty-one women completed the MRS, HHF, and FFQ questionnaires yielding a response rate of 100.0 %. The ages of the women ranged from 42 to 64, with a mean of 51.6 years (SD = 5.33). All of the women in the sample were Caucasian, and most of the women who participated in the study were married 75.4 % (n = 46), compared to 18% who were divorced (n = 11), 1.6% who were widowed (n = 1), and 4.9% who were single (n=3).

Of the sixty-one women, 31% (n =19) were postmenopausal and 69% (n = 42) were considered perimenopausal. 78.7% (n = 48) were not using hormonal replacement therapy (HRT) and while 21.3 % (n = 13) of the women were using some form of hormone replacement therapy. The numbers of pregnancies for the sample were also

noted. The mean number of pregnancies was 2.36 (SD =1.43), the median was 2, and the number of pregnancies in sample formed a bell curve. Demographic data were presented in Table 5.

Table 5. Characteristics of the Sample (n = 61).

Characteristic	%	n
Marital Status		
Married	75.4	46
Divorced	18.0	11
Widowed	1.6	1
Single	4.9	3
Menopausal Status		
Perimenopausal	68.9	42
Postmenopausal	31.1	19
Hormone Replacement Therapy		
No	78.7	48
Yes	21.3	13
Number of Pregnancies		
0	14.8	9
1	6.6	4
2	34.4	21
3	24.6	15
4	13.1	8
5	4.9	3
6	1.6	1

Description of Symptoms

Table 6 measures the Cronbach coefficency of the Menopause Rating Scale tool used in the sample. It described the ranges, means, and alpha reliabilities of the somato-

vegetative, psychological, and urogenital dimensions according to The Menopause Rating Scale. The desired alpha reliability for an assessment tool is 0.80. The alpha coefficient for the somato-vegetative dimension was 0.84, the alpha coefficient for the urological dimension was 0.75 percent, and the alpha coefficient for the psychological test was 0.60. The scores range from 0 to 3.75 for the somato-vegetative score, from 0 to 3.25 for the psychological, and from 0 to 3.33 for the urological dimensions. (See Table 6). The mean scores for each dimension are also presented in Table 6. The means ranged from 0.99 to 1.11, indicating that the symptoms were reported as mild.

Table 6. Description of Dimensions of Peri- & Postmenopausal Women According to the Menopause Rating Scale (n = 61).

Dimensions of MRS	Range of scores	Mean of scores (SD)	α Reliability
Somato-vegetative	0-3.75	1.11 (.67)	0.84
Psychological	0-3.25	1.07 (.81)	0.60
Urologenital	0-3.33	0.99 (.85)	0.75

*Cronbach co-efficiency test

The Menopause Rating Scale data are presented in Table 7. The sample consisted of sixty-one women; however, cases were omitted for analysis if data was missing. Therefore, the symptoms for irritability and anxiety from only 60 women were used for analysis.

Frequencies

As indicated by the mean scores in Table 7, the majority of the women reported mild to moderate symptoms with a range of 35% (n = 21) for heart discomfort to 72.1 %

(n = 44) for exhaustion. The exceptions to majority reporting mild to moderate symptoms was that the majority had no symptoms for heart discomfort at 63.4% (n = 39) and anxiety at 50.8% (n = 30). Conversely, 16.4% (n = 10) of the women in the sample reported that sleep problems were severe to very severe.

Table 7. Frequency and Degree of Symptoms of Peri- & Postmenopausal Women (n = 61).

Severity of Symptom Symptom	No Symptoms n (%)	Mild/Moderate n (%)	Severe/Very Severe n (%)
Hot Flashes	14 (23.0)	40 (65.5)	7 (11.5)
Heart Discomfort	39 (63.4)	21 (35.0)	1 (1.6)
Sleep Problems	14 (22.9)	37 (60.7)	10 (16.4)
Depressive Mood	19 (31.1)	37 (60.7)	5 (8.2)
Irritability	21 (35.0)	35 (58.3)	4 (6.7)
Anxiety	30 (50.8)	24 (39.3)	6 (9.9)
Exhaustion	10 (16.4)	44 (72.1)	7 (11.5)
Sexual Problems	22 (36.1)	33 (54.0)	6 (9.9)
Bladder Problems	27 (44.3)	31 (50.8)	3 (4.9)
Vaginal Dryness	24 (39.3)	31 (50.8)	6 (9.9)
Joint/Muscular Pain	21 (35.0)	38 (61.9)	2 (3.1)

Table 8 compares the menopausal status (perimenopausal and postmenopausal) with symptoms. The results were measured by a t-test which measured whether or not two independent variables were related. In this test, nominal data were compared (e.g. measuring the severity of the symptoms if the participant reported the symptom and the menopausal status of the participant). If the p was less than 0.05, the variables were related. If the p was greater than 0.05, the null hypothesis was rejected, and the variables were independent of each other and not related. The variables showed no statistical

Table 8. Relationship of Menopausal Status of Peri- & Postmenopausal Women to Symptoms (n =61).

Variable (Symptom)	t-test	Significance of t-test (2-tailed)
Hot Flashes	-1.957	p=0.055
Heart Discomfort	0.435	p=0.665
Sleep Problems	0.008	p=0.993
Depressive Mood	1.013	p=0.315
Irritability	0.755	p=0.453
Anxiety	1.019	p=0.312
Exhaustion	-0.649	p=0.519
Sexual Problems	-0.739	p=0.463
Bladder Problems	0.697	p=0.489
Vaginal Dryness	-1.676	p=0.099
Joint/Muscular Pain	-0.211	p=0.834

*t-test

significance between the type of symptoms and menopausal status meaning that there was no relationship between the menopausal status of the women and the menopausal symptoms the women were experiencing.

Table 9 presents data about the nutrients investigated in this study. Nutrients were categorized by carbohydrate (total grams of carbohydrates; number of daily servings of vegetables; fruits and fruit juices, and grains; and percent of kilocalorie from sweets and desserts) and fiber (total fiber in grams; total bean fiber in grams total fruit and vegetable fiber in grams; and total grain fiber in grams). Similar to the MRS responses, cases were omitted for a analysis if data was missing; therefore, the dietary intake data from only 54 women was used for analysis.

Table 9. Frequency of Nutrient and Food Group Intake of Peri- & Postmenopausal Women (n = 54).

Independent Variable	Mean of scores (SD)	Range of scores
Carbohydrate		
Grams of carbohydrate	184.22 (78.54)	60.3-403.2
Daily servings vegetables	3.60 (2.16)	0.8-12.80
Daily servings fruits and juices	1.44 (1.02)	0.3-4.30
Daily servings grains	3.64 (2.42)	0.2-10.40
Percent of kcal sweets/desserts	12.30 (8.70)	1.2-45.0
Fiber		
Grams of fiber	17.28 (9.19)	4.6-54.90
Grams of fiber-beans	2.72 (2.20)	0.04-11.74
Grams of fiber-vegetables & fruits	8.34 (4.84)	1.8-29.65
Grams fiber-grains	6.72 (5.21)	0.7-27.60

A Pearson's R correlational matrix was conducted for the perimenopausal (n =39) and postmenopausal women (n =15) to look for a relationship between the multiple of variables including the three MRS subscales (somatic, psychological, and urological) and the carbohydrate and fiber variables. No unexpected correlationals were found. Relationships that were found were expected such as relationships between somatic and psychological variables as well as urological. Other expected relationships found were between fiber, fruit, and vegetables as well as relationship between carbohydrate and fiber. (See Table 10 for Pearson's correlations of perimenopausal women and Table 11 for postmenopausal women).

Research Questions

Research Question 1: What is the relationship between dietary intake of carbohydrates and the severity of menopausal symptoms in perimenopausal and postmenopausal women?

. Block 1 of the sequential regression model explained the variance associated with the demographic variables (number of pregnancies and menopausal status). Block 2 explained the variance associated with dietary variables. This analysis was conducted for each dimension of the MRS (i.e. somatovegetative, psychological, and urogenital). (See Appendix C, Table 1 for Regression 1 presents results for carbohydrates). No significant relationships were noted for any of the three dimensions. Because the urogenital dimension seemed to explain a very small portion of variance, (R^2 = .066 for Block 1) further analysis was conducted to explore the factors contributing to that variance. See Appendix C, Table 2 for squared semi-partial correlations for the variables. Over 9% of the variance in the urogenital dimension can be explained by the number of pregnancies.

Table 10. Relationship Between Menopausal Symptoms, Carbohydrate and Fiber Intake, & Status of Perimenopausal Women.

Indep Variable	Somato	Psycho	Urogen	#Pregn	Serv Vegeta	Servin Fruits	Serv Grn	% Sweets	CHO gms	Fib gms	Fib bean	Fib Vg/ft	Fib Grn
Somato	1.000												
Psycho	0.594	1.000											
Urogen	0.494	0.199	1.000										
# Preg	0.063	-0.165	0.445	1.000									
Srv Veg	0.055	0.011	0.186	0.186	1.000								
Srv Frt	0.008	-0.073	-0.011	-0.089	0.352	1.000							
Srv Grn	0.144	0.195	-0.073	-0.032	0.133	0.253	1.000						
% Swt	0.168	0.230	-0.091	-0.440	-0.448	-0.281	0.025	1.000					
CHO grams	0.176	0.173	-0.122	-0.133	0.235	0.473	0.834	0.208	1.000				
Fib gms	0.156	0.118	0.071	0.141	0.644	0.616	0.656	-0.238	0.781	1.000			
Fib bean	0.356	0.227	0.073	0.182	0.354	0.215	0.340	-0.088	0.432	0.637	1.000		
Fib veg/fruit	0.042	0.042	0.083	0.206	0.787	0.717	0.233	-0.406	0.462	0.818	0.348	1.000	
Fib grns	0.095	0.115	0.008	-0.016	0.239	0.297	0.930	0.013	0.850	0.771	0.402	0.337	1.000

Table 11. Relationship Between Menopausal Symptoms, Carbohydrate and Fiber Intake, & Status of Postmenopausal Women.

Indep Variable	Somato	Psycho	Urogen	#Pregn	Serv Vegeta	Servin Fruits	Serv Grains	% Sweets	CHO Gram	Fib Gram	Fib Bean	Fib Vg/Fr	Fib Grn
Somatov	1.000												
Psycho	0.832	1.000											
Urogeni	0.451	0.512	1.000										
#Pregn	-0.391	-0.489	-0.314	1.000									
Srv Veg	0.372	0.220	0.046	0.056	1.000								
Srv Frt	0.218	0.207	0.040	-0.530	0.312	1.000							
Srv Grn	-0.283	-0.108	-0.655	0.307	0.290	0.056	1.000						
% Swt	-0.156	-0.140	0.011	0.147	-0.440	-0.109	-0.063	1.000					
CHO grams	-0.221	-0.127	-0.480	0.079	0.408	0.429	0.808	0.179	1.000				
Fib gms	-0.055	-0.114	-0.404	0.234	0.639	0.315	0.726	-0.137	0.825	1.000			
Fib bean	-0.137	-0.352	-0.239	0.357	0.572	0.208	0.271	-0.260	0.418	0.720	1.000		
Fib veg/fruit	0.441	0.329	0.153	-0.318	0.783	0.781	0.160	-0.247	0.526	0.611	0.499	1.000	
Fib grns	-0.257	-0.208	-0.575	0.376	0.319	-0.023	0.869	0.036	0.782	0.871	0.429	0.195	1.000

Research Question 2: What is the relationship between dietary intake of fiber and the severity of menopausal symptoms in perimenopausal and postmenopausal women? (See Table 10 for the Pearson's correlations of perimenopausal women and Table 11 for the postmenopausal women.) Table 3 in Appendix C showed the sequential regression analysis between the dependent variables (somatovegetative, psychological, and urogenital) and the independent variables (fiber intake). Similar to the results with carbohydrates, no significant relationship was noted with the fiber variables. Again, as in the previous discussion, the number of pregnancies further explains the variance of over 9.4% for the urogenital dimension. (See Table 4 in Appendix C for squared partial and semi-partial correlations for fiber.)

CHAPTER IV

DISCUSSION AND RECOMMENDATIONS

In this chapter, a brief summary of the study will be presented followed by a discussion and conclusions of study findings. A section of recommendations for research, practice, and education will also be included.

Summary

The purpose of this study was to explore the relationship between dietary intake of carbohydrates and fiber to menopausal symptoms. The design was a descriptive study that used self-reported surveys.

Methods of data collection involved completion of the Health History Form, the Block 98.1 Food Frequency Questionnaire, and the Menopause Rating Scale Instrument by sixty-one women from a Midwestern University city. The sample consisted of women ages 42 through 65 with a mean age of 51.6 years and with fairly homogeneous characteristics. All of the women were Caucasian, and most of the women who participated were married (74.5%, $\underline{n} = 46$). In the total sample, the number of pregnancies the women had ranged zero to six with mean of 2.36 pregnancies. The women were divided into two categories with 68.9%, ($\underline{n} = 42$) being considered perimenopausal and 31.1% ($\underline{n} = 19$) being postmenopausal.

The findings related to the MRS instrument reliability for this study showed a strong measure of internal consistency of the menopausal symptoms. Therefore, a high reliability index for this MRS survey utilized for this study was revealed.

Menopausal symptoms were not associated with dietary intake of carbohydrate or fiber. The urological symptoms could have been caused from previous pregnancies.

Discussion and Conclusions

The sample was chosen by age because women between the ages of 40 and 65 usually fall somewhere in the range of perimenopausal to postmenopausal. However, because no blood work was drawn to verify hormone levels of the perimenopausal women, there could have been women in the sample who had not reached the perimenopausal status and were not exhibiting menopausal symptoms at all. There was one woman in the sample with no menopausal symptoms. Many of the symptoms in the MRS could be construed as symptoms of aging, (e.g. sleep problems, joint, or muscular pain) or could be related to depression, anxiety, or mood disorders (e.g. depressive mood, irritability, anxiety, or sexual problems). These symptoms could have been from caused from hormonal changes or from other causes as well.

The MRS alpha reliability in the sample was much greater than when the tool was used in the study described in the literature review. The reliability estimates for original scores in literature review had scores for the somatovegetative symptoms as ($\alpha = 0.25$), for psychological symptoms as ($\alpha = 0.30$), and for urological symptoms as ($\alpha = 0.19$). The alpha coefficient for the somatovegetative dimension was 0.84, the alpha coefficient for the urological dimension was 0.75 percent, and the alpha coefficient for the psychological test was 0.60. Since desired alpha co-efficiency for a tool is 0.80, the

somatovegetative dimension surpassed what was desired. The urological dimension was near what was expected, and though the psychological was much below the desired score of 0.80, which would normally be considered substandard, 0.60 for a psychological score is considered acceptable by scientists for this type of test.

The findings of the study did not show any significant statistical relationship between carbohydrate intake and menopausal symptoms. The mean total carbohydrate intake for the sample was 184.22 grams. This was above the 130 grams per day recommended by the USDA (2005) for women requiring a 2000 calorie per day intake, but not an excessively above average carbohydrate intake. Dietary Recommended Intake (USDA, 2005) for total carbohydrate intake for adults and children is a minimum of 130 grams per day (a total of 45% to 65% of energy). Couston, Liu, and Reaven (1983), study linked the high carbohydrate diet of 60% with high triglycerides and low HDLs as compared to the 40% carbohydrate diet. Menopausal symptoms were not evaluated in this study, and the Coulston et al. (1983) study was only conducted for 10 days on a small sample showing limitations in sample size as well as length of study; however, it seems that this study was relative to the women in the sample in that these women also had a higher than recommended RDA carbohydrate intake.

It may noted that some of the women in the study anecdotally stated that they were eating a diet low in carbohydrates (e.g. Atkins type) and experiencing fewer menopausal symptoms. This was evident with the low range of 60 grams of carbohydrates in the sample. After analysis, however, the sample mean of 184.22 showed that the average woman was eating the recommended average amount of carbohydrates daily. Lupton (2002) also recommended an RDI of no more than 25 percent of the total

caloric intake from sweets and food or drinks with added sugar. The sample mean intake for sweets and desserts was a percent of 12.30 which was less than half of what was recommended for an RDI for sweets, but due to the difficulty dividing the sweets from the fats in the dietary analysis from the percent sweet/ desserts calculation, the investigators were unable to assess the true sugar intake of the sample. The samples' average daily intake for fruits was 1.44 servings. A USDA recommendation (Daily Food Guide) recommends 2-3 servings of fruits per day. The samples' average daily intakes for vegetables were 3.60 servings. The USDA (Daily Food Guide) recommends 3-5 servings of vegetables per day. Therefore, the sample met the minimum daily requirement for vegetables but did not meet the minimum daily requirement for fruits. It may also be noted that a public campaign to eat more fruits and vegetables was going on during the time when the dietary information was collected which may have had some influence on the amount of fruit and vegetables the sample were consuming daily.

The sample mean intake for grains was 3.64 servings per day. This was not specified as whole or refined grains in the analysis. USDA recommends a daily intake is at least 3 or more ounces of whole grains (specified) per day or 6-11 servings (Daily Food Guide) of grains per day. Therefore, our sample did not have an adequate sample of grain daily intake.

The recommended dietary fiber intake for women ages 31 to 70 is 21-25 grams per day. The daily intake of fiber for the sample was 17.28 grams which was very low in comparison to USDA recommendations (IOM, 2004). Initially, fiber intake did appear to explain small variation in urological symptoms when examined statistically, however with further analysis within the regression, the findings indicated that women with more

pregnancies exhibited more frequent and/ or severe urogenital symptoms. When fiber was examined for practical significance, by looking at effect size instead of statistical significance, there was a squared semi-partial correlation of 0.049. The significance of the effect size showed that fiber independently contributed 5 percent of unique variance predicting over and beyond all of the rest of the predictors. According to Cohen's (1988) guidelines, any variance labeled 0.02 is considered as a small predictor. A variance labeled 0.13 is considered a medium predictor, and a variance labeled 0.26 is considered a large predictor. Thus, number of pregnancies (.094), servings of grains (.054), grams of carbohydrates (.049), and fiber grains (.049) are all considered small to medium effect sizes and should be studied further in future studies.

Limitations

Limitations of this study included the small sample size. Due to the short amount of time allowed to solicit a sample, and the limited sample size of women employees at the university, the investigators were not able to obtain a larger sample size. Also, because of the number of variables included in the study (e.g. dietary intake of carbohydrate intake, fiber, and the eleven menopausal symptoms), the small sample size made the analysis difficult to interpret as to significant statistical correlations. This study was a small piece of the larger study I AM, and the sample was a result of the larger study. Had the investigator designed the study on an individual basis, a power analysis would have been completed and a larger sample would have been obtained. The power analysis concluded that a sample size of at least 435 to 578 women would have been needed to obtain the statistical significance from the data. Since the adequate sample size

was not obtained, effect size which is independent of sample size was analyzed for practical significance.

Another limitation that existed was that there were no hormone levels drawn on the study participants. This information was necessary to determine that the women, though they fit the ages of perimenopause, were actually perimenopausal. The postmenopausal women had stated that they had ceased to menstruate and therefore, were clinically considered menopausal. If blood work had been drawn to evaluate the hormone levels of the perimenopausal women, there may have been evidence that some of the women were not in perimenopause at all, thus exhibiting little to no symptoms. Another limitation from the study was that the questionnaires were self-reported. It is assumed that the women answered they questions to the best of their abilities, but no scientific analysis was done to verify symptoms, dietary analysis, or hormonal levels at the time of data collection. As discussed in the review of literature, there appears to be an interaction between fiber, carbohydrates, and other physiological parameters, but the limitation of not being able to obtain blood work limited the study in establishing a link in a possible hormonal profile.

The food frequency questionnaire used was a valid and reliable tool to assess dietary intake, however, investigators found the analysis of the data difficult to interpret. Sweets and desserts were counted in with the carbohydrates in the analysis. This limitations of the output of the data made sorting the fat content of those foods from the carbohydrates difficult during the analysis. There was also no way to differentiate between monosaccharides, oligosaccharides, or polysaccharides in the analysis of the carbohydrates. Another limitation of the tool was that using a food frequency

questionnaire, though is was the most widely used, reliable, and valid tool available, still depends on the participants memory and dietary recall. The information remains subjective and may be fallible.

A last limitation to consider was that though the MRS tool had been used frequently in many studies, there had not been many studies to prove the tool validity and reliability. This study did find the tool to have a good alpha reliability score on all three dimensions with the Cronbach's co- efficiency alpha reliability test.

Recommendations

Implications for nursing research, practice, and education can be drawn from the findings of this study. To continue to investigate whether there is a relationship between carbohydrate intake and menopausal symptoms, the profession must conduct additional research in this area. Another recommendation would be to use a larger random sample to increase the generalizability of the findings. The sample group who participated in the study was probably too homogenous for optimal research. Obtaining blood work, perhaps estradiol, progesterone, and testosterone levels and a lipid panel could also prove to be beneficial when assessing symptoms and diet to determine if subjective data and objective data correlate well.

New areas for research could be considered based on findings of this study. Future research that could be valuable and was recommended in the following areas: dietary interventions after a dietary analysis of carbohydrate intake and menopausal symptoms, adjusting different amounts of carbohydrate intakes and assessing menopausal symptoms, and adjusting different amounts of fiber intakes and assessing menopausal

symptoms. Another area for research includes whether an increase of sweets and desserts have any impact on menopausal symptoms.

Recommendations for practice include continuing to promote dietary education of recommended daily dietary intakes for carbohydrates, fiber, and daily servings of fruits, vegetables, and grains. Any adjustments in diet may improve health if not improve menopausal symptoms.

Recommendations for nursing education and future research include using research findings to plan future studies in this area, as there are so few studies on dietary intake and menopausal symptoms. This study has not ruled out that correlations may exist that have not been explored. It is essential that this subject be explored more fully, since it is evident that there will be so many women reaching the ages of menopause in the next twenty years.

APPENDICES

APPENDIX A
RESEARCH INSTRUMENTS

INTEGRATIVE ANALYSIS OF MENOPAUSE STUDY
Health History

- Please complete this patient intake and health history as thoroughly as possible.
- The form is used to learn about your unique healthcare needs.
- Print all information and mark anything you don't understand with a question mark.
- Fill out the Medications & Supplements page as complete as possible.

Name_____Date (MM/DD/YY)_____

Date of Birth (MM/DD/YY)_____ UND -NAID#___

Address_____

City_____ State__ Zip Code__

Telephone (Home) (__)___ (Work) (__)_____

Cell Phone (__)_____

E-Mail_____

Marital Status: Married___ Separated___ Divorced___ Widowed___ Single____

Live with: Spouse____ Children___ Parents____ Relatives____ Friends____ Alone____

When and where did you last receive medical or health care?____

_____

_____

_____

_____

_____

What was the reason?_____

_____

_____

_____

_____

MEDICAL HISTORY

What medical problems have you been treated for in you lifetime? (Please list)

HOSPITALIZATION AND SURGERY

Please list hospitalizations and surgeries you have had:

MOTOR VEHICLE OR OTHER ACCIDENTS

Please list type and date of accident.

REPRODUCTIVE HISTORY/ GENERAL INFORMATION

Write in the **"Age"** or **"Number"** as indicated.	Write **"Y"**, for **YES**, if you have symptom now.
Write **"P"** if you **ever** had symptom in the **PAST**.	Write an **"N"** if you **NEVER** had that symptom.
If a question does **NOT APPLY**, write "**NA**".	**DO NOT LEAVE ANY SPACE BLANK**

REPRODUCTION HISTORY

Age menses began

Date of Last Menstrual Period

For the majority of your life:

Average number of days of bleeding

Length of cycle (days between periods)

Bleeding between periods?

Have cycles been regular?

If no, when did they become irregular?

What is frequency of bleeding now?

Painful menses? (**Y**, **N** or **P**)

Excessive flow? (**Y**, **N** or **P**)

Have you ever used Birth Control Pills

What type?

Still Taking BCP?

If NO, date discontinued? (Mo/Yr)

Are you sexually active?

Difficulty conceiving?

Number of pregnancies?

Number of live births?

Number of miscarriages?

Number of abortions?

HORMONE REPLACEMENT THERAPIES

Used Hormone Replacement Therapy?

What is the Name of the HRT

Still Taking the HRT?

If NO, date discontinued (Mo/Yr))

Did you quit because of symptoms?

What symptoms caused you to quit?

Did you quit because of fear of cancer?

Other reason(s) you quit:

List symptoms that occurred when HRT stopped:

WELLNESS

Do you do breast self exam?

How often? (Example: monthly, quarterly)

Breast exam by healthcare provider?

Last exam by provider? (M0o/Yr)

Last mammogram? (Mo/Yr)

Date of last Pap Smear? (Mo/Yr)

Have you EVER used tobacco?

If Yes, how many packs per day?

For how long? (Number of Years)

When discontinued? (Year you quit)

If you have experienced the following, how long?

Depression

Mood swings

Anxiety or nervousness

Tension

MENOPAUSE

Menopausal symptoms?

Date symptoms began (Month/Year)

Complementary Therapies for Menopause

Place an "X" mark if you Currently, Never, or Previously used:	C	N	P
Special Diet			
Exercise			
Guided Imagery			
Visualization			
Reflexology			
Yoga			
Qi Gong			
Tai Chi			
Homeopathy			
Massage			
Relaxation			
Herbs			
Meditation			
Prayer			
Supplements			
Other, specify:			

Medications & Supplements

Please List All Of The Following and Bring Them With You To Your Appointment:

Prescription Medications "Over-The-Counter" Medications
Vitamins & Minerals Herbs
Soy or other Isoflavones All Other Supplements

Please provide ***Name of Prescription or Supplement***, the ***Dose***, ***How Often*** you take it, ***How Long*** you have been taking it.

EXAMPLE

Name of Prescription or Supplement	Dose	How often	How Long
Vitamin C	*500mg*	*1 x day*	*1 year*

Medications & Supplements

Name of Prescription or Supplement	Dose	How often	How Long

Medications & Supplements (continued)

Name of Prescription or Supplement	Dose	How often	How Long

Is there any thing else you think we should know about your health that we have not asked?

NAID#_____

Menopause Rating Scale (MRS)

Which of the following symptoms apply to you at this time? Please, mark the appropriate box for each symptom. For symptoms that do not apply, please mark 'none'.

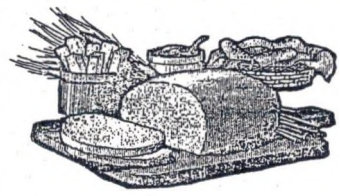
Symptoms:	none	mild	moderate	severe	very severe
Score =	0	1	2	3	4
1. Hot flushes, sweating (episodes of sweating)	☐	☐	☐	☐	☐
2. Heart discomfort (unusual awareness of heart beat, heart skipping, heart racing, tightness)	☐	☐	☐	☐	☐
3. Sleep problems (difficulty in falling asleep, difficulty in sleeping through, waking up early)	☐	☐	☐	☐	☐
4. Depressive mood (feeling down, sad, on the verge of tears, lack of drive, mood swings)	☐	☐	☐	☐	☐
5. Irritability (feeling nervous, inner tension, feeling aggressive)	☐	☐	☐	☐	☐
6. Anxiety (inner restlessness, feeling panicky)	☐	☐	☐	☐	☐
7. Physical and mental exhaustion (general decrease in performance, impaired memory, decrease in concentration, forgetfulness)	☐	☐	☐	☐	☐
8. Sexual problems (change in sexual desire, in sexual activity and satisfaction)	☐	☐	☐	☐	☐
9. Bladder problems (difficulty in urinating, increased need to urinate, bladder incontinence)	☐	☐	☐	☐	☐
10. Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse)	☐	☐	☐	☐	☐
11. Joint and muscular discomfort (pain in the joints, rheumatoid complaints)	☐	☐	☐	☐	☐

RESPONDENT ID NUMBER

TODAY'S DATE

	DAY	YEAR
○ Jan		
○ Feb		
○ Mar	0 0	1998 ○
○ Apr	1 1	1999 ○
○ May	2 2	2000 ○
○ Jun	3 3	2001 ○
○ Jul	4	2002 ○
○ Aug	5	2003 ○
○ Sep	6	2004 ○
○ Oct	7	2005 ○
○ Nov	8	2006 ○
○ Dec	9	2007 ○

FOOD QUESTIONNAIRE



This form is about the foods you usually eat. It will take about 30 - 40 minutes to complete.

- **Please answer each question as best you can. Estimate if you aren't sure.**
- **Use only a No. 2 pencil.**
- **Fill in the circles completely, and erase completely if you make any changes.**

Please print your name in this box.

SEX
○ Male
○ Female

If female, are you pregnant or breast feeding?
○ No
○ Yes
○ Not female

AGE

WEIGHT pounds

HEIGHT ft. in.

First, a few general questions about what you eat.	AVERAGE USE IN THE PAST YEAR								
	LESS THAN ONCE per WEEK	1-2 per WEEK	3-4 per WEEK	5-6 per WEEK	1 per DAY	1 1/2 per DAY	2 per DAY	3 per DAY	4+ per DAY
About how many servings of vegetables do you eat, per day or per week, not counting salad or potatoes?	○	○	○	○	○	○	○	○	○
About how many servings of fruit do you eat, not counting juices?	○	○	○	○	○	○	○	○	○
How often do you eat cold cereal?	○	○	○	○	○	○	○	○	○
How often do you use fat or oil in cooking?	○	○	○	○	○	○	○	○	○

What kinds of fat or oil do you usually use in cooking? MARK ONLY ONE OR TWO

- ○ Don't know, or Pam
- ○ Stick margarine
- ○ Soft tub margarine
- ○ Butter
- ○ Butter/margarine blend
- ○ Low-fat margarine
- ○ Corn oil, vegetable oil
- ○ Olive oil or canola oil
- ○ Lard, fatback, bacon fat
- ○ Crisco

PLEASE DO NOT WRITE IN THIS AREA

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During the past year, have you taken any vitamins or minerals regularly, at least once a month?

○ No, not regularly ○ Yes, fairly regularly →

(IF YES) WHAT DID YOU TAKE FAIRLY REGULARLY?

VITAMIN TYPE	HOW OFTEN					FOR HOW MANY YEARS?					
	DIDN'T TAKE	A FEW DAYS per MONTH	1-3 DAYS per WEEK	4-6 DAYS per WEEK	EVERY DAY	LESS THAN 1 YR.	1 YEAR	2 YEARS	3-4 YEARS	5-9 YEARS	10+ YEARS
Multiple Vitamins. Did you take...											
Regular Once-A-Day, Centrum, or Thera type	○	○	○	○	○	○	○	○	○	○	○
Stress-tabs or B-Complex type	○	○	○	○	○	○	○	○	○	○	○
Antioxidant combination type	○	○	○	○	○	○	○	○	○	○	○
Single Vitamins (not part of multiple vitamins)											
Vitamin A (not beta-carotene)	○	○	○	○	○	○	○	○	○	○	○
Beta-carotene	○	○	○	○	○	○	○	○	○	○	○
Vitamin C	○	○	○	○	○	○	○	○	○	○	○
Vitamin E	○	○	○	○	○	○	○	○	○	○	○
Folic acid, folate	○	○	○	○	○	○	○	○	○	○	○
Calcium, alone or combined with something else	○	○	○	○	○	○	○	○	○	○	○
Zinc, alone or combined with something else	○	○	○	○	○	○	○	○	○	○	○
Iron	○	○	○	○	○	○	○	○	○	○	○
Selenium	○	○	○	○	○	○	○	○	○	○	○

If you took Once-a-day, Centrum or Thera-type multiple vitamins, did you usually take types that ○ contain minerals, iron, zinc, etc. ○ do not contain minerals ○ don't know

If you took vitamin C or vitamin E:

How many milligrams of **vitamin C** did you usually take, on the days you took it?
○ 100 ○ 250 ○ 500 ○ 750 ○ 1000 ○ 1500 ○ 2000 ○ 3000+ ○ Don't know

How many IUs of **vitamin E** did you usually take, on the days you took it?
○ 100 ○ 200 ○ 300 ○ 400 ○ 600 ○ 800 ○ 1000 ○ 2000+ ○ Don't know

Did you take any of these supplements at least once a month?

○ Ginkgo ○ Ginseng ○ St. John's Wort ○ Kava Kava ○ Echinacea ○ Melatonin ○ DHEA
○ Glucosamine/Chondroitin ○ Something else ○ Didn't take these

---

The next section is about your <u>usual</u> eating habits in the past year or so. This includes all meals or snacks, at home or in a restaurant or carry-out. There are two kinds of questions to answer for each food:

HOW OFTEN, on average, did you eat the food during the past year?
*Please DO NOT SKIP any foods. Mark "Never" if you didn't eat it.

HOW MUCH did you usually eat of the food?

*Sometimes we ask how <u>many</u> you eat, such as 1 egg, 2 eggs, etc., ON THE DAYS YOU EAT IT.
*Sometimes we ask "how much" as A, B, C or D. LOOK AT THE ENCLOSED PICTURES. For each food, pick the picture (bowls or plates) that looks the most like the serving size you usually eat.
(If you don't have pictures: A=1/4 cup, B=1/2 cup, C=1 cup, D=2 cups.)
*Sometimes we made the "D" column a darker color. This is just to remind you to make sure you really eat that large a serving.

EXAMPLE: This person drank apple juice twice a week, and had one glass each time. Once a week he ate a "C" sized serving of rice (about 1 cup).

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MON.	2-3 TIMES per MON.	ONCE per WEEK	TWICE per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH <u>EACH TIME</u> SEE PORTION SIZE PICTURES FOR A-B-C-D				
Apple juice	○	○	○	○	○	●	○	○	○	How many glasses each time	● 1	○ 2	○ 3	○ 4
Rice	○	○	○	○	●	○	○	○	○	How much each time	○ A	○ B	● C	○ D

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME How many glasses on the days you drink it?				
How often do you drink the following beverages?										How many glasses **each time**	1	2	3	4
Tomato juice or V-8 juice	○	○	○	○	○	○	○	○	○					
Real 100% orange juice or grapefruit juice, including fresh, frozen or bottled	○	○	○	○	○	○	○	○	○	How many glasses **each time**	1	2	3	4

When you drink orange juice, how often do you drink a calcium-fortified brand?
○ Usually calcium-fortified ○ Sometimes calcium-fortified ○ Hardly ever calcium-fortified ○ I don't know ○ I don't drink orange juice

Other real fruit juices like apple juice, prune juice, lemonade	○	○	○	○	○	○	○	○	○	How many glasses	1	2	3	4
Kool-Aid, Hi-C, or other drinks with added vitamin C	○	○	○	○	○	○	○	○	○	How many glasses	1	2	3	4
Drinks with some juice in them, like Sunny Delight, Juice Squeeze	○	○	○	○	○	○	○	○	○	How many bottles	1	2	3	4
Instant breakfast milkshakes like Carnation, diet shakes like SlimFast, or liquid supplements like Ensure	○	○	○	○	○	○	○	○	○	How many glasses or cans	1	2	3	4
Glasses of milk (any kind)	○	○	○	○	○	○	○	○	○	How many glasses	1	2	3	4

When you drink glasses of milk, what kind do you usually drink? **MARK ONLY ONE:**
○ Whole milk ○ Reduced-fat 2% milk ○ Low-fat 1% milk ○ Non-fat milk
○ Rice milk ○ Soy milk ○ I don't drink milk or soy milk

HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
Regular soft drinks, or bottled drinks like Snapple (not diet drinks)	○	○	○	○	○	○	○	○	○	How many bottles or cans	1	2	3-4	5+
Beer or non-alcoholic beer	○	○	○	○	○	○	○	○	○	How many bottles or cans	1	2	3-4	5+

What kind? **MARK ONLY ONE:** ○ Regular beer ○ Light beer ○ Non-alcoholic beer ○ I don't drink beer

Wine or wine coolers	○	○	○	○	○	○	○	○	○	How many glasses	1	2	3-4	5+
Liquor or mixed drinks	○	○	○	○	○	○	○	○	○	How many drinks	1	2	3-4	5+
Glasses of water, tap or bottled	○	○	○	○	○	○	○	○	○	How many glasses	1	2	3-4	5+
Coffee, regular or decaf	○	○	○	○	○	○	○	○	○	How many cups	1	2	3-4	5+
Tea or iced tea (not herb teas)	○	○	○	○	○	○	○	○	○	How many cups	1	2	3-4	5+

What do you usually add to coffee? **MARK ONLY ONE:** ○ Cream or half & half ○ Nondairy creamer ○ Milk ○ None of these

What do you usually add to tea? **MARK ONLY ONE:** ○ Cream or half & half ○ Nondairy creamer ○ Milk ○ None of these

Do you usually add sugar (or honey) to coffee? ○ No ○ Yes IF YES, how many teaspoons each cup? ① ② ③-④ ⑤+

Do you usually add sugar (or honey) to tea? ○ No ○ Yes IF YES, how many teaspoons each cup? ① ② ③-④ ⑤+

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HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME — SEE PORTION SIZE PICTURES FOR A-B-C-D				
How often do you eat each of the following fruits, just during the 2-3 months when they are in season?														
Raw peaches, apricots, nectarines, while they are in season	○	○	○	○	○	○	○	○	○	How many each time	○ 1/2	○ 1	○ 2	○ 3
Cantaloupe, in season	○	○	○	○	○	○	○	○	○	How much	○ 1/8	○ 1/4	○ 1/2	○ 1
Strawberries, in season	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Watermelon, in season	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Any other fruit in season, like grapes, honeydew, pineapple, kiwi	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
How often do you eat the following foods all year round? Estimate your average for the whole year.														
Bananas	○	○	○	○	○	○	○	○	○	How many each time	○ 1/2	○ 1	○ 2	○ 3
Apples or pears	○	○	○	○	○	○	○	○	○	How many each time	○ 1/2	○ 1	○ 2	○ 3
Oranges or tangerines	○	○	○	○	○	○	○	○	○	How many each time	○ 1/2	○ 1	○ 2	○ 3
Grapefruit	○	○	○	○	○	○	○	○	○	How much	○ 1/2	○ 1	○ 2	○ 3
Canned fruit like applesauce, fruit cocktail, or dried fruit like raisins	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D

HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
Eggs, including egg biscuits or Egg McMuffins (Not egg substitutes)	○	○	○	○	○	○	○	○	○	How many eggs each time	○ 1	○ 2	○ 3	○ 4
Bacon	○	○	○	○	○	○	○	○	○	How many pieces	○ 1	○ 2	○ 3	○ 4
Breakfast sausage, including sausage biscuits	○	○	○	○	○	○	○	○	○	How many pieces	○ 1	○ 2	○ 3	○ 4
Pancakes, waffles, French toast, Pop Tarts	○	○	○	○	○	○	○	○	○	How many pieces	○ 1	○ 2	○ 3	○ 4
Breakfast bars, granola bars, Power bars	○	○	○	○	○	○	○	○	○	How many	○ 1	○ 2	○ 3	○ 4
Cooked cereals like oatmeal, cream of wheat or grits	○	○	○	○	○	○	○	○	○	Which bowl		○ B	○ C	○ D
High-fiber cereals like All Bran, Raisin Bran, Fruit-n-Fiber	○	○	○	○	○	○	○	○	○	Which bowl		○ B	○ C	○ D

Which high-fiber cereal do you eat most often? **MARK ONLY ONE:** ○ All Bran or Bran Buds ○ Raisin Bran ○ Fiber One, Fruit-n-Fiber, etc. ○ Something else ○ I don't know ○ I don't eat it

Product 19, Just Right or Total cereal	○	○	○	○	○	○	○	○	○	Which bowl		○ B	○ C	○ D
Any other cold cereal, like Corn Flakes, Cheerios, Special K	○	○	○	○	○	○	○	○	○	Which bowl		○ B	○ C	○ D
Milk or milk substitutes on cereal	○	○	○	○	○	○	○	○	○	How many oz. on cereal	○ 3 oz.	○ 4-5 oz.	○ 6-7 oz.	○ 8+ oz.
Yogurt or frozen yogurt	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Cheese, sliced cheese or cheese spread, including on sandwiches	○	○	○	○	○	○	○	○	○	How many slices	○ 1	○ 2	○ 3	○ 4

When you eat cheese, is it ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ Don't know/don't eat

195475 PLEASE DO NOT WRITE IN THIS AREA

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME SEE PORTION SIZE PICTURES FOR A-B-C-D				
How often do you eat the following vegetables, including fresh, frozen, canned or in stir-fry, at home or in a restaurant?														
Broccoli	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Carrots, or mixed vegetables or stews containing carrots	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Corn	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Green beans or green peas	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Spinach	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Mustard greens, turnip greens, collards	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
French fries, fried potatoes or hash browns	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
White potatoes not fried, incl. boiled, baked, mashed & potato salad	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Sweet potatoes, yams (Not in pie)	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Cole slaw, cabbage	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Green salad	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Raw tomatoes, including in salad	○	○	○	○	○	○	○	○	○	How much	○ 1/4	○ 1/2	○ 1	○ 2
Salad dressing	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4

Is your salad dressing ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ Don't know/don't use

HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
Any other vegetable, like okra, squash, cooked green peppers	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Refried beans or bean burritos	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Chili with beans (with or without meat)	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Baked beans, black-eye peas, pintos, any other dried beans	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Vegetable stew	○	○	○	○	○	○	○	○	○	Which Bowl		○ B	○ C	○ D
Vegetable soup, vegetable beef, chicken vegetable, or tomato soup	○	○	○	○	○	○	○	○	○	Which Bowl		○ B	○ C	○ D
Split pea, bean or lentil soup	○	○	○	○	○	○	○	○	○	Which Bowl		○ B	○ C	○ D
Any other soup, like chicken noodle, chowder, mushroom, instant soups	○	○	○	○	○	○	○	○	○	Which Bowl		○ B	○ C	○ D
Spaghetti, lasagna or other pasta <u>with tomato sauce</u>	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Cheese dishes <u>without</u> tomato sauce, like macaroni and cheese	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Pizza, including carry-out	○	○	○	○	○	○	○	○	○	How many slices	○ 1	○ 2	○ 3	○ 4

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME SEE PORTION SIZE PICTURES FOR A-B-C-D				
Do you ever eat chicken, meat or fish? ○ Yes ○ No **IF NO, SKIP TO NEXT PAGE**														
Hamburgers, cheeseburgers, meat loaf, at home or in a restaurant	○	○	○	○	○	○	○	○	○	How much meat	○ 1/8 lb.	○ 1/4 lb.	○ 1/2 lb.	○ 3/4 lb.
Tacos, burritos, enchiladas, tamales, etc. with meat or chicken	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Beef steaks, roasts, pot roast, or in frozen dinners or sandwiches	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
How do you like beef cooked? ○ Rare ○ Medium ○ Well done ○ I don't eat beef														
Pork chops, pork roasts, or dinner ham	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
When you eat meat, do you ○ Avoid eating the fat ○ Sometimes eat the fat ○ Often eat the fat ○ I don't eat meat														
Veal, lamb or deer meat	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Ribs, spareribs	○	○	○	○	○	○	○	○	○	How many ribs	○ 3-4	○ 5-6	○ 7-8	○ 9+
Liver, including chicken livers or liverwurst	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Gizzard, pork neckbones, chitlins, pigs feet, etc.	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Mixed dishes with beef or pork, like stew, corned beef hash, stuffed cabbage, meat dish with noodles	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Mixed dishes with chicken, like chicken casserole, chicken & noodles, pot pie or in stir-fry	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Fried chicken, at home or in a restaurant	○	○	○	○	○	○	○	○	○	# medium pieces	○ 1	○ 2	○ 3	○ 4
Chicken or turkey not fried, such as baked, grilled, or on sandwiches	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
When you eat chicken, do you ○ Avoid eating the skin ○ Sometimes eat the skin ○ Often eat the skin														

HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
Oysters	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Other shellfish like shrimp, scallops, crabs	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Tuna, tuna salad, tuna casserole	○	○	○	○	○	○	○	○	○	How much of the tuna	○ A	○ B	○ C	○ D
Fried fish or fish sandwich, at home or in a restaurant	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Other fish, not fried	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Hot dogs, or sausage like Polish, Italian or chorizos	○	○	○	○	○	○	○	○	○	How many	○ 1	○ 2	○ 3	○ 4
Are your hot dogs ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ Don't know/don't eat them														
Boloney, sliced ham, turkey lunch meat, other lunch meat	○	○	○	○	○	○	○	○	○	How many slices	○ 1	○ 2	○ 3	○ 4
Are your lunch meats ○ Usually low-fat or turkey ○ Sometimes low-fat ○ Hardly ever low-fat														

HOW OFTEN	NEVER	A FEW TIMES per YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	HOW MUCH EACH TIME — SEE PORTION SIZE PICTURES FOR A-B-C-D				
Noodles, macaroni, pasta salad	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Tofu, bean curd	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Meat substitutes, such as veggie burgers, Gardenburgers	○	○	○	○	○	○	○	○	○	How many patties	○ 1	○ 2	○ 3	○ 4
Chinese food, Thai or other Asian food, not counted above	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Snacks like potato chips, corn chips, popcorn (not pretzels)	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D

Are these snacks ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ Don't know/don't eat

HOW OFTEN	NEVER	FEW/ YEAR	ONCE/ MONTH	2-3 TIMES/ MONTH	ONCE/ WEEK	TWICE/ WEEK	3-4 TIMES/ WEEK	5-6 TIMES/ WEEK	EVERY DAY	HOW MUCH EACH TIME				
Peanuts, other nuts or seeds	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Crackers	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Doughnuts, Danish pastry	○	○	○	○	○	○	○	○	○	How many	○ 1	○ 2	○ 3	○ 4
Cake, sweet rolls, coffee cake	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D

Are they ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ Don't know/don't eat

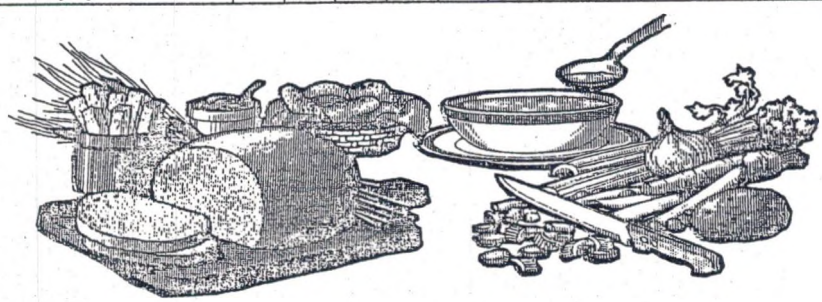
Cookies	○	○	○	○	○	○	○	○	○	How many	○ 1-2	○ 3-5	○ 6-7	○ 8+

Are your cookies ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ I don't know/don't eat

Ice cream, ice milk, ice cream bars	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D

Is your ice cream ○ Usually low-fat ○ Sometimes low-fat ○ Hardly ever low-fat ○ I don't know/don't eat

Pumpkin pie, sweet potato pie	○	○	○	○	○	○	○	○	○	How many slices	○ 1/2	○ 1	○ 2	○ 3
Any other pie or cobbler	○	○	○	○	○	○	○	○	○	How many slices	○ 1/2	○ 1	○ 2	○ 3
Chocolate candy, candy bars	○	○	○	○	○	○	○	○	○	How many bars	① small	① medium	① large	② large
Other candy, not chocolate, like hard candy, caramel, jelly beans	○	○	○	○	○	○	○	○	○	How many pieces	○ 1-2	○ 3-5	○ 6-7	○ 8+



PLEASE DO NOT WRITE IN THIS AREA

HOW OFTEN	NEVER OR A FEW TIMES PER YEAR	ONCE per MONTH	2-3 TIMES per MONTH	ONCE per WEEK	2 TIMES per WEEK	3-4 TIMES per WEEK	5-6 TIMES per WEEK	EVERY DAY	2+ TIMES per DAY	HOW MUCH EACH TIME SEE PORTION SIZE PICTURES FOR A-B-C-D				
Biscuits or muffins	○	○	○	○	○	○	○	○	○	How many **each time**	○ 1	○ 2	○ 3	○ 4
Rolls, hamburger buns, English muffins, bagels	○	○	○	○	○	○	○	○	○	How many **each time**	○ 1/2	○ 1	○ 2	○ 3
Dark bread like rye or whole wheat, including in sandwiches	○	○	○	○	○	○	○	○	○	How many slices **each time**	○ 1	○ 2	○ 3	○ 4
White bread or toast, including French, Italian, or in sandwiches	○	○	○	○	○	○	○	○	○	How many slices **each time**	○ 1	○ 2	○ 3	○ 4
Corn bread, corn muffins	○	○	○	○	○	○	○	○	○	How many pieces	○ 1	○ 2	○ 3	○ 4
Tortillas	○	○	○	○	○	○	○	○	○	How many **each time**	○ 1	○ 2	○ 3	○ 4
Rice, or dishes made with rice	○	○	○	○	○	○	○	○	○	How much	○ A	○ B	○ C	○ D
Margarine (not butter) on bread or on potatoes or vegetables, etc.	○	○	○	○	○	○	○	○	○	How many pats (tsp.)	○ 1	○ 2	○ 3	○ 4
Butter (not margarine) on bread or on potatoes or vegetables, etc.	○	○	○	○	○	○	○	○	○	How many pats (tsp.)	○ 1	○ 2	○ 3	○ 4
Gravy	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4
Peanut butter	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4
Jelly, jam, or syrup	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4
Mayonnaise, sandwich spreads	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4
Catsup, salsa or chile peppers	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4
Mustard, soy sauce, steak sauce, barbecue sauce, other sauces	○	○	○	○	○	○	○	○	○	How many Tbsp.	○ 1	○ 2	○ 3	○ 4

Did you use the pictures to choose your serving size on this form? ○ Yes ○ No ○ I didn't have any pictures.

Would you say your health is ○ Excellent ○ Very good ○ Good ○ Fair ○ Poor

How many times have you gone on a diet? ○ Never ○ 1-2 ○ 3-5 ○ 6-8 ○ 9 or more

Did you ever drink more beer, wine or liquor than you do now? ○ Yes ○ No

How many hours do you watch television or video, per day or per week on average?
○ None ○ 1-6 hours/week ○ 1 hour/day ○ 2 hours/day ○ 3 hours/day ○ 4+ hours/day

Do you smoke cigarettes now? ○ No ○ Yes
IF YES, On the average about how many cigarettes a day do you smoke now?
○ 1-5 ○ 6-14 ○ 15-24 ○ 25-34 ○ 35 or more

What language do you usually speak at home or with friends?
○ English ○ Spanish ○ Something else ○ English & something else equally

What is your ethnic group? (MARK ONE OR MORE)
○ Hispanic or Latino ○ Black or African American ○ American Indian or Alaska Native
○ White, not Hispanic ○ Asian ○ Native Hawaiian or Other Pacific Islander

Thank you very much for filling out this questionnaire. Please take a minute to go back and fill in anything you may have skipped.

PLEASE DO NOT WRITE IN THIS AREA

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APPENDIX B
LETTER OF CONSENT

INTEGRATIVE ANALYSIS OF MENOPAUSE STUDY

Consent Form

This study is being conducted by Dr. Donna Morris, faculty at the UND College of Nursing (CON); Kathy Edwards, RN, BSN, master's student in the CON; Debbie Evenson, doctoral student in the CON; Dr. Glenda Lindseth, faculty at the CON; Dr. Steve Owen, biostatistician and faculty at the University of Texas Health Science Center at San Antonio; and Dr. Joseph Collins, ND, author of *Discover your menopause type* and the Menopause Type® Questionnaire.

The purposes of this study is to evaluate the nutritional intake, symptoms that affect quality of life, and physical activity patterns that women experience as they approach, go through and complete menopause; and to assess the impact of foot reflexology on women. You were identified as a possible participant because your age fell between 42 and 65 years. If you decide to participate in this study, you will be asked to complete several forms and procedures, including the following:

- Health and physical activity information, several menopause questionnaires, and a questionnaire detailing your nutritional intake. In addition, some body measurements (for example, height weight, waist) will be taken.
- Blood tests that will provide information about your hormone levels and the amount of sugar in your blood.
- The menopause questionnaires a few weeks after your appointment (by mail)

Over the next 6 months a random sample of women will be invited to participate in foot reflexology treatments. All women participating in the study will be invited to complete the menopause questionnaires and a daily log of symptoms for a two-week period.

Once all of the treatments have been completed, you will have an opportunity to review the results of the Food Frequency Questionnaire and the lab test results. Upon your approval, the laboratory test results will be sent to your primary physician.

Participation in the initial visit will take approximately 1 ½ -- 2 hours. Completion of the follow-up questionnaires will take approximately 15-30 minutes. Each reflexology treatment will last for approximately one hour. Completion of the menopause questionnaires and the daily log should take a maximum of 15 minutes per day for two weeks. Altogether, women participating in this study will spend about 3 to 5 ½ hours over a period of 6 months, the variation depending on how many reflexology treatments you receive.

Answering questions related to your health may cause you to feel sad or upset. If this should occur, one of the investigators will be happy to talk further with you, and to refer you to the UND Employee Assistance Program if you so desire.

Your participation in this study will help healthcare providers to better understand and work with women going through menopause, and will ultimately assist women in making more effective choices for themselves. It will also help us to document the effects of reflexology treatments. In brief, you will play an important role in the ongoing development of optimal women's health care, affecting women today and in future generations.

All information that you share with the research team is confidential. The data collected during this study will be kept either in a locked file drawer (paper copies) in the principal investigator's office, or in automated files with security protection. The data will be kept for a minimum of three years and then destroyed. Only the research team and people who audit IRB procedures will have access to the data. If the results of this study are written in a scientific journal or presented at a scientific meeting, neither your name nor any identifying information will be used. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

Your decision to take part in this research study is entirely voluntary. If you decide to participate, you are free to discontinue participation at any time without it being held against you.

The investigators involved are available to answer any questions you have concerning this program. In addition, you are encouraged to ask any questions concerning this program that you may have in the future. Questions may be asked by calling: Dr. Donna Morris at (701) 777-4529, Ms. Kathy Edwards at (701) 240-4674, or Ms. Debbie Evenson at (701) 777-6045. If you have any other questions or concerns, please call the Office of Research and Program Development at (701) 777-4279.

You understand that all information (including results of the questionnaires and surveys, and laboratory results) is being collected for research purposes only and is not a substitute for medical care.

All of your questions have been answered and you have been encouraged to ask any questions that you may have concerning this study in the future.

You have read all of the above and willingly agree to participate in this study explained to you by _____.

Subject's Signature _____

Date _____

INTEGRATIVE ANALYSIS OF MENOPAUSE STUDY

Consent for Laboratory Test Results Release

I hereby authorize you to forward *abnormal* laboratory results to my primary physician upon receipt.

_____ YES _____ NO

Upon completion of this study, I hereby authorize you to forward *all* laboratory results to my primary physician.

_____ YES _____ NO

If yes to either of the above:

Physician's Name _____

Address_____

City_____ State_____ Zip Code_____

Telephone #: (Office)_____ (Fax)_____

Subject's Signature _____

Date _____

APPENDIX C
PEARSON'S R TABLE

Table 12. Summaries of Regression Models Predicting Dimensions of Carbohydrate Intake and Menopausal Symptoms ($n = 54$).

Dependent Variable (MRS Dimension)	Predictor Variables	Adjusted R^2	Significance Test
Somatovegetative	**Block 1** Number pregnancies Menopausal Status	-.031	$F_{2,58} = 0.23, p = .80$
Somatovegetative	**Block 2** Grams Carbohydrate Servings Vegetables Servings Fruits Servings Grains Percent Sweets/desserts	-.116	$F_{5,48} = 0.28, p = .92$
Psychological	**Block 1**	.017	$F_{2,58} = 1.53, p = .23$
Psychological	**Block 2**	-.009	$F_{5,48} = 0.49, p = .78$
Urogenital	**Block 1**	**.066**	$F_{2,58} = 3.10, \mathbf{p = .05}$
Urogenital	**Block 2**	.030	$F_{5,48} = 1.32, p = .27$

Note. For Psychological and Urogenital dimensions, Block 1 and Block 2 predictor variables are not restated. * $p < .05$ for statistical significance. ** Hierarchical Regression Model

Table 13. Proportion of Unique Variance Explained by Carbohydrate Predictors Using the Urogenital Dimension (n = 54).

Independent Variable	Semi-partial Correlation	Squared Semi-partial Correlation	Effect size
Menopausal Status	.093	.009	trivial
Number Pregnancies	.307	**.094**	small
Grams Carbohydrates	.221	**.049**	small
Servings Vegetables	.141	**.020**	small
Servings Fruits	.015	<.001	trivial
Servings Grains	.232	**.054**	small
Percent sweets/desserts	.057	.003	trivial

* effect sizes: small ≥0.02, medium ≥0.13, large ≥ 0.26

Table 14. Summaries of Regression Models Predicting Dimensions of Fiber Intake and Menopausal Symptoms (n = 54).

Dependent Variable (MRS Dimension)	Predictor Variables	Adjusted R^2	Significance Test for Block
Somatovegetative	**Block 1** Number pregnancies Menopausal Status	-.031	$F_{2,58} = 0.23, p = .80$
Somatovegetative	**Block 2** Grams Fiber Fiber: Beans Fiber: Vegetables & Fruits Fiber: Grains	.015	$F_{4,49} = 1.20, p = .32$
Psychological	**Block 1**	.017	$F_{2,58} = 1.53, p = .23$
Psychological	**Block 2**	.016	$F_{4,49} = 1.22, p = .31$
Urogenital	**Block 1**	**.066**	$F_{2,58} = 3.10$, $\boldsymbol{p = .05}$
Urogenital	**Block 2**	.060	$F_{4,49} = 1.88, p = .14$

Note. For Psychological and Urogenital dimensions, Block 1 and Block 2 predictor variables are not restated. * $p < .05$ for statistical significance. ** Hierarchical Regression Model

Table 15. Proportion of Unique Variance Explained by Fiber Predictors Using the Urogenital Dimension (n = 54).

Independent Variable	Semi-partial Correlation	Squared Semi-partial Correlation	Effect size
Menopausal Status	.093	.009	trivial
Number Pregnancies	.307	**.094**	small
Grams Fiber	.075	.006	trivial
Fiber: Beans	.057	.003	trivial
Fiber: Vegetables, and Fruits	.098	.010	trivial
Fiber: Grains	.221	**.049**	small

* effect sizes: small ≥0.02, medium ≥0.13, large ≥ 0.26

APPENDIX D
CONCEPTUAL DEFINITIONS

For the purpose of this study, the following definitions were used:

Carbohydrate may be described in a number of different manners, but the universal method of distinguishing a carbohydrate from another food group is to classify it by its chemical formula C:H:O of 1:2:1. Carbohydrates may be grouped into sugars, oligosaccharides, and polysaccharides, (Mann, 2001).

Sugars include three main subgroups: monosaccharides (glucose, fructose, and galactose), disaccharides (sucrose, lactose, and maltose), and alcohol sugars (sorbitol and mannitol). According to Mann (2001), "The 3 monosaccarides (glucose, fructose, and galactose) are the building blocks of naturally occurring di-, oligo-, and polysaccharides, (p.59)."

Glucose and fructose are naturally combined to formed sucrose, which is found in honey, sugar cane and beets, some vegetables, fruits, and berries. Lactose is naturally formed from glucose, and galactose and is found in milk and some milk products. The disaccharide, maltose, is two glucose molecules naturally combined and is found in barley and wheat sprouts. The sugar alcohol, sorbital, also occurs naturally in some fruit, (Mann, 2001).

Oligosaccharides consist of maltodextrins, raffinose, stachyose, verbascose, and fructooligosaccharides. These carbohydrates may be found naturally in plant seeds, grains, vegetables, and other plants, or they may be produced industrially. Oligosaccharides, with the exception of maltodextrins, are not digested in the small

intestine. Maltodextrins are used as sweeteners and fat substitutes to modify food textures to increase carbohydydrate content and decrease fat content in foods, (Mann, 2001).

Polysaccharides consist of starch, modified starch, or non starch polysaccharides. The starch carbohydrates naturally occur as partial crystalline granules classified as either amylase or amylopectin. Amylopectin is found in maize, rice, barley, and sorghum. Cereal starches contain up to one third of amylase in content. When in the crystalline form, both amylopectin and amylase are indigestible to humans and insoluble in water. When heated, however, the crystalline form breaks down into a gelatin form which may be digested, and this form is called modified starch. The third form of polysaccharide is non-starch which consists of insoluble material including cellulose or hemicellulose and soluble material including pectins, beta-glucans, mucilates, and gums. These materials are components of dietary fiber, (Mann, 2001).

Dietary fiber may be defined as "substances that cannot be broken down by human digestive enzymes," (Sizer & Whitney, 2004, p97). Fiber may be slightly broken down by bacteria that reside in the human digestive tract. Fiber may be classified as either soluble or insoluble. "Soluble fibers dissolve in water and have a gummy or gel-like appearance (e.g., fruit pectin)", (Sizer & Whitney, 2004, p. 97). Insoluble fibers do not dissolve in water and "comprise the tough, fibrous structures of fruit, vegetables, and grains", (Sizer & Whitney, 2004, p. 97). Thus, most fiber acts as roughage, aiding in digestion and elimination.

Climacteric refers to the time that marks the cessation of a woman's reproductive period, (Speroff, Glass, & Kase, 1999).

Menopause symptoms refers to any symptoms, whether objective or subjective, that a woman may experience during the time her body takes to adjust to declining estrogen, progesterone, or androgen levels, (Speroff, Glass, & Kase, 1999).

Psychological symptoms include depressed feelings, irritability, anxiety, and feelings of exhaustion.

Somatovegetative symptoms include sweating or hot flashes, cardiac complaints, sleeping disorders, joint and muscular complaints.

Urogenital symptoms include sexual problems, urinary complaints, and vaginal dryness.

Postmenopausal status refers to the characterization of a woman who has experienced cessation of menses for a period of one year (Speroff, Glass, & Kase, 1999).

Perimenopausal status refers to the characterization of years prior to menopause that include the changes from a regular ovulatory cycle to the cessation of menses. It may be used interchangeably with menopause transition, and is not necessarily characterized by an irregular menses, (North American Menopause Society, 2004).

Metabolic syndrome refers to any person at increased risk for coronary heart disease as a result of having three or more of the following risk factors: obesity, dyslipidemia, hypertension, insulin resistance, sedentary lifestyle, or postmenopausal status.

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